Handbook of

NON-SUBSTANCE ADDICTIVE BEHAVIORS

J. Billieux, A. Rial,
A. Nogueira-López and F. Pascual

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To our families, who are the anchor
and the horizon of our lives.

Action-Research: no research without action and no action without research.

Kurt Lewin

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PROLOGUE 1

Francisca Sureda Llull[1]

1 Government Delegate for the National Drugs Plan (Spain)

Addictions have been linked to the use of psychoactive substances. However, the political, economic, and social contexts of our globalized world are in constant flux, in the same way as new, potentially addictive substances appear on the market. In recent years, in addition to the emergence of new tobacco products and psychoactive substances, we have witnessed profound technological and social transformations that have gone hand in hand with new addictions, not necessarily linked to substance use. Aware of this reality, the National Strategy on Addictions 2017-2024 explicitly incorporated non-substance addictions for the first time within the framework of the National Drugs Plan. This inclusion represented a major advance in the acknowledgment by public policies of the need to address phenomena such as gambling, problematic internet use, social networks, and video games. Since then, these behaviors have been a priority focus in the action plans designed within the Strategy's framework.

Monitoring and surveillance of these behaviors is essential to properly analyze the situation, anticipate their evolution, and design effective interventions and public policies tailored to reality. In this sense, the Spanish Observatory on Drugs and Addiction (OEDA) assumes a fundamental role by systematically collecting epidemiological information and analyzing trends, allowing for a deeper understanding of the magnitude and evolution of these behaviors in our society. The most recent data in Spain derived from our surveys reveals the increasing relevance of this public health problem. According to the results of the ESTUDES 2025 survey, conducted among students aged 14 to 18, 24.4% of teenagers have gambled (online and/or at gambling venues) in the last year, with notable differences by sex, reaching 34.7% among boys compared with 14% among girls. Likewise, 15.3% of students exhibit problematic use of social media, reflecting the impact that certain digital environments can have on our youth's life, every day.

Other indicators also reflect early and widespread access to digital environments. In 2025, 14.9% of boys and 15.7% of girls aged 14 to 18 have a potentially problematic use of social media. In addition, 4.1% of students show a possible problematic use of

pornography, a phenomenon that is much more prevalent among adolescent males than among females (7.2% versus 1%, respectively).

In the healthcare sector, the information system of the National Drugs Plan has also begun to specifically collect data on admissions to treatment for behavioral addictions, evidencing that these behaviors are not only an emerging phenomenon from a social perspective, but also a clinical reality that demands specialized attention.

In this context, the *Handbook of Non-Substance Addictive Behaviors* is an invaluable tool that allows us to contextualize non-substance addictions from different perspectives. Its chapters present a broad and up-to-date review of the main advances in research on these addictions, examining issues from their conceptualization and measurement to their clinical, social, and preventive implications.

This publication has been promoted by Socidrogalcohol, a leading scientific organization in Spain in the field of study and treatment of addictions, with the financial support of the Government Delegation for the National Plan on Drugs through the call for grants for interregional addiction programs. Neither could this have been possible without the backing of the public entity Red.es, UNICEF Spain, the University of Santiago de Compostela and the Spanish General Council of Informatics Engineering (CCII) (within the framework of the *Digital Childhood* project) which have also provided their economic and institutional support.

The compendium brings together a distinguished international group of researchers and leading specialists on addictions, who analyze these phenomena from multiple perspectives, providing a rigorous and multidisciplinary view of a field that is still taking shape, in which important scientific advances coexist with conceptual and methodological debates that are imperative for its development. The handbook also focuses special attention on key aspects for public action, such as the design of prevention strategies, early detection, and evidence-based clinical interventions. These contributions are essential to guiding decision-making and for designing effective policies to address the risks associated with specific digital and behavioral patterns.

The Government Delegation for the National Drugs Plan considers a priority to continue expanding knowledge on addictions in all of their variations, including non-substance addictions.

I take this opportunity to acknowledge the editors of this publication, as well as all of the authors whose research contributes to this volume. Cooperation between public institutions, scientific associations and the research community is indispensable to advance prevention, social awareness and improved treatments for affected individuals.

I am convinced that this handbook will become a reference work for researchers, health professionals, public policy officials and for all individuals who seek a deeper understanding of these phenomena and contribute to their prevention and intervention based on scientific knowledge.

PROLOGUE 2

Jesús Herrero Poza[1]

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The technological revolution has radically transformed our social interactions, our way of working, and our access to both information and leisure. In the last twenty years, new technologies have made exponential progress, drastically changing our lifestyle, and the digital space has continuously expanded to such an extent that both virtual and analog boundaries are increasingly blurred. Global connectivity enables instant communications, almost anywhere and at any time, sending and receiving all kinds of content. Thanks to this, distances have been reduced, knowledge is more accessible, and geographical and cultural barriers have been broken: a turning point that will make the immediate past unrecognizable. In the workplace, automation and teleworking have transformed traditional dynamics, and the use of Artificial Intelligence has heightened efficiency in many sectors. In our daily lives, ICTs have improved our quality of life in many aspects, whether in more efficient public services, or in the modernization of Public Administrations, simplifying our management of day-to-day paperwork.

However, like every critical technological revolution, this one is not limited to this area alone, but transcends and decisively impacts politics, society, the economy, and culture. Despite its impressive and unquestionable advances, it entails a series of disadvantages and drawbacks. Today we are facing issues in terms of privacy and the use of our personal data, the gap between those who have access to digital tools and knowledge and those who are left behind, the environmental impact and massive use of water and electricity resources required by data centers, the jobs at risk due to the use of Artificial Intelligence, and the quality of the data being used.

Therefore, it is crucial that institutions, administrations, public and private bodies and entities, universities and research centers participate in studying, knowing and understanding a revolution of such magnitude to be capable of intervening and addressing its consequences and adverse effects. The path to its solution can only be found by understanding the nature of the problem. This Handbook is an extraordinarily valuable contribution toward an in-depth understanding of the adverse consequences that technologies are causing among youth and adolescents. Hyperconnectivity, the

constant stream of new content, brief and superficial mass entertainment, and the display of picture-perfect, idealized lives of others are associated (directly or indirectly) with the deterioration of the younger generations' mental health. The persuasive behind-the-scenes architecture of many digital platforms, such as the famous *sticky* effects or FOMO, produces effects intended to constantly "hook" users, creating addictions that, like all addictions, end up affecting their daily lives. Thus, social networks, theoretically designed to connect us, result in eroding quality time, triggering a constant search for external validation accompanied by comparative anxiety, interrupting sleep, causing eye strain, and often limiting participation in face-to-face activities and interactions, essential for people's healthy and holistic development, even amplifying isolation and loneliness.

All of this has secondary consequences. According to the report by the Organisation for Economic Co-operation and Development (OECD, 2023)[1], assessing literacy levels in different population segments, for the first time our cognitive capacity is decreasing, in adults and children. Some authors suggest that these consequences are directly related to our contemporary mode of cultural consumption which, to a great extent, occurs through mobile phones and social networks, which are at the root of a diminished concentration capacity, increasing users' impatience, hindering academic achievement, reducing memory capacity, and lowering reading comprehension. This would be reflected in lesser ability to read lengthy texts, in favor of short texts or videos and images, the inability to finish a book, the failure to develop intellectual activities that require perseverance and reflection, or the abandonment of any exercise in critical thinking or comprehension, which requires a certain cognitive effort. To this must be added the content types that are accessed or consumed, which are increasingly biased, superficial and infantilized, and which would gradually prevail over more analytical or reflective materials. Watching a long interview, a film without flashy effects, or reading a newspaper are activities considered increasingly outdated and unappealing.

In synthesis, this technology has impacted education, the habits and behaviors of youth and adolescents, and, in a likely high percentage, has steered them toward new forms of dependency and disorders that, in human terms, represent a regrettable setback. In democratic terms as well. The citizens' decline in critical thinking and reasoning skills, especially among the younger generation, increases our vulnerability and makes us easily manipulated by dishonest, reactionary, or polarized discourses. This Handbook is a "map" that presents the worrying reality that we experience in our digitized societies and, as such, is intended to provide guidance for governments and institutions, and Public Administrations, in making the best decisions in this area. A grounded theoretical foundation allows for the design of an honest, courageous, and rigorous action plan, with truly effective measures.

1 https://www.oecd.org/en/publications/do-adults-have-the-skills-they-need-to-thrive-in-a-changing-world_b263dc5d-en.html?nocache=0

Two features of this publication, in my opinion, enrich and differentiate it as a whole. First, the large number of contributions (28 chapters) provides a detailed analysis of different addictive behaviors, maladaptive or problematic uses that technology is generating among youth, —a phenomenon which, by the way, is not exclusive to this population segment— and which, furthermore, extends to other related topics or areas, reinforcing the multifaceted or holistic vision from which we must necessarily understand the problem.

Second, it moves away from an alarmist or condemnatory approach to technology. The combination of the different chapters allows for a responsible, yet constructive, overview of the implications or adverse effects that can result from an abusive or unhealthy use of ICTs, without falling into the error outrightly rejecting a technological revolution that has undoubtedly contributed to improving many aspects of our lives. This manuscript is a sound counterattack against the unfounded claims, without any scientific basis, that are spread against technology. The authors adjust and clarify the harms of new technologies, adhering exclusively to what is measurable, demonstrable and empirically verified, avoiding both trivialization and alarmism.

The contributions of this collective work are countless. Above all, it aspires to be a reference manual that will not rest idly upon the shelves of university libraries, but rather will be consulted and enjoyed by researchers specializing in the subject. On the contrary, their contributions should serve the researcher who wishes to delve deeper into the digital space and its effects, the critical citizen who wants to know and understand the historical context in which they live, and, why not, also the politician who seeks solid arguments with which to adopt measures to face the risks derived from social networks without control, without ethical values and without rules of the game. That is why reading this Handbook should be a public right.

I conclude by expressing my appreciation to those who have made this magnificent work possible, starting with the authors, who have an excellent research track record, as is reflected in the quality of each of the 27 chapters, for having compiled a publication that will be a reference for the future. Of course, my personal thanks to the coordinators of the book: Professor Joël Billieux (University of Lausanne), Professor Antonio Rial (University of Santiago), Professor Abel Nogueira (University of Burgos) and Dr. Francisco Pascual (Socidrogalcohol). Thanks also to UNICEF, University of Santiago de Compostela and the Council of Colleges of Computer Engineering, for supporting this exciting initiative and, of course, to Red.es and the National Observatory of Technology and Society (ONTSI), for firmly believing in it from the beginning.

My thanks and congratulations to everyone.

PROLOGUE 3

NON-SUBSTANCE ADDICTIONS IN THE MODERN ERA

Dr. Luke Clark[1]

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Landmark observations in addiction science can be traced back over the past century (e.g. the *British Journal of Addiction* —now simply *Addiction*— was launched in 1903). For the field of non-substance or behavioural addictions, its relative *absence* of history is in some ways a defining feature, as much of the field deals with activities that inherently rely on modern digital technologies. Pathological gambling became the prototype in this category (as discussed by Potenza & Stefanovics, this volume); it was first included as an impulse control disorder in the DSM-III in 1980, and then reclassified as an addictive disorder in the DSM-5 in 2013. Gaming disorder was later introduced in the ICD-11 in 2019, alongside gambling disorder. Around this time, the *Journal of Behavioral Addictions* launched, in 2012, and the International Society for the Study of Behavioral Addictions in 2013. As this volume capably highlights, the field has seen an accelerating rate of research in recent years, as well as significant strides in scientific rigour and theory.

Recognizing that this is a field still in its youth, perhaps it is no surprise that its early years have been beset by a fair degree of controversy. An early line of work introduced the concept of internet addiction (Young, 2004) and a questionnaire, the Internet Addiction Test, to describe compulsive engagement in a range of online activities. In the intervening years, many have argued that the internet is just a route of accessing a wider range of more specific activities, and questioned whether the precise behavioural target (e.g. gambling, gaming, pornography) is more relevant to understanding excessive use than the internet itself (Brand, 2022). Nevertheless, recent work continues to propose utility in conceptualizing Problematic Usage of the Internet as an umbrella term, akin to substance use disorders, or obsessive-compulsive and related disorders (Zare-Bidoky et al., 2025).

The recognition of Gaming Disorder was formalized in advanced releases of the ICD-11 from 2015 (Musetti et al., 2025). This also proved hugely controversial, polarizing opinion between researchers aligned with cyberpsychology and media studies versus clinicians and addictions researchers (van Rooij et al., 2018). There was also significant pushback in statements from a powerful game design industry (King, 2018). It struck

me as curious at the time that many of the caveats being raised in this debate —the uncritical translation of screening tools from substance use disorders, the use of video games as a form of coping with other symptoms, or the comparability of tolerance and withdrawal symptoms between gaming and substance use disorders— were issues that had never been thoroughly dismissed in relation to gambling, although the gambling disorder re-classification had been broadly welcomed by most stakeholders.

The third point of controversy, from a more theoretical perspective, is the most central question of all: with gambling and gaming disorder as recognized addictions, which other behaviours should be considered 'truly' addictive (Ince et al., 2025)? One view might be that any rewarded or 'mood modifying' activities have the potential to become addictive. The cause célèbre cases of such a view have changed over the past two decades —tango dancing (Targhetta et al., 2013), taking selfies (Starcevic et al., 2018), and milk tea addiction (Qu et al., 2023) are my favorite teaching examples. These serve as test cases for addiction criteria (Griffiths, 2005), and highlight the tensions between ascertaining functional impairment and the prospect of overpathologizing everyday behaviours (see Starcevic et al, this volume).

Whatever your view on selfitis *et al*, there are other putative behavioural addictions that now command significant fields of credible research. The frontrunners for recognition alongside gambling disorder and gaming disorder are compulsive sexual behavior disorder (including problematic pornography use), which is currently listed as a diagnosis as an impulse control disorder in ICD-11, compulsive buying/shopping disorder, and problematic social media use (Brand et al., 2025). In addition, we should not overlook the utility of an addictions 'lens' in relation to consumption of food and/or eating, especially with contemporary focus on ultra-processed foods (Gearhardt & DiFeliceantonio, 2023). Here, we have to consider eating as a necessary behaviour for survival, as well as the deeper question of whether such foods are best conceptualized in a substance or non-substance addictions framework.

To resolve this debate, we would benefit from a clearer understanding of the psychological and neural mechanisms that allow some activities to escalate to harmful levels. With my colleague Martin Zack, we have argued that reward uncertainty may be one such prerequisite (Clark & Zack, 2023). In the case of gambling, reward uncertainty is central to its definition, and its effects via the 'variable ratio' schedule are well known, as well as the associated impact on dopamine signalling. Video game design also relies on randomized rewards, and in combination with in-game 'micro-transactions', this creates one of the more pernicious elements of modern gaming, the loot box (see Xiao & Brooks, this volume). In the case of social media, infinite scrolls and personalized recommendations are implicated in over-consumption, and similar features amplify reward uncertainty for other online content, including shopping and pornography. Yet we recognize that reward uncertainty by itself is unlikely to be sufficient. Different forms of gambling vary in their harm potential, and the temporal properties by which uncertainty in maintained or resolved are likely to be critical.

Surveying this new volume, I find it interesting to ask how the field has started to overcome these controversies. The recognition of circularity that arises when screening items for substance addictions are uncritically transposed to novel behaviours prompted greater rigour and attention to psychometrics in the field (Grubbs & Boness, 2025). Theory has improved substantially, both at a 'macro' level with integrative frameworks like I-PACE (Brand et al., 2025), and at a micro level that elaborates key mechanisms such as the role of habit formation in digital technology use (Flayelle et al., 2023). New opportunities for data collection, and corresponding insights from data science, have powerfully augmented the traditional reliance on self-report, such as the use of smartphone telemetry and account-linked 'behavioural tracking' of online gambling. At the same time, the valuable insight that can be gleaned from in-depth qualitative work is now well recognized. And lastly, the adoption of open science principles including study pre-registration and the availability of open data and materials are substantially improving the robustness and reproducibility of the evidence base (Eben et al., 2023).

With these gains in scientific credibility, research on non-substance addictions is now able to engage effectively with key policy-facing questions in modern society, such as the impact of smartphone bans in schools (Baggio et al., 2025), the effects of warning messages in video games (Garrett et al., 2023), or natural experiments on the effects of legalized gambling (Yeola et al., 2025) to name just three examples. Such work relies heavily on the researchers themselves. Further advances will require continued expansion of the scientific community, including greater diversity (Sinclair & Clark, 2024) and representation of historically marginalized groups, as well as higher prioritization of federal and independent research funding. Progress also relies on the willingness of these researchers to ask the right questions, using bold, interdisciplinary and innovative designs. I'm delighted to see the current volume showcase these strengths in abundance.

REFERENCES

Baggio, S., Wade, T., Radunz, M., Galanis, C. R., Billieux, J., Starcevic, V., Quinney, B., & King, D. L. (2025). Psychological consequences of school mobile phone bans: Emulated trial of a natural experiment in South Australia. *Computers in Human Behavior*, *172*, 108767. https://doi.org/10.1016/j.chb.2025.108767

Brand, M. (2022). Can internet use become addictive? *Science*, *376*(6595), 798–800.

Brand, M., Antons, S., Bőthe, B., Demetrovics, Z., Fineberg, N. A., Jimenez-Murcia, S., King, D. L., Mestre-Bach, G., Moretta, T., Müller, A., Wegmann, E., & Potenza, M. N. (2025). Current advances in behavioral addictions: From fundamental research to clinical practice. *American Journal of Psychiatry*, *182*, 155–163. https://doi.org/10.1176/appi.ajp.20240092

Clark, L., & Zack, M. (2023). Engineered highs: Reward variability and frequency as potential prerequisites of behavioural addiction. *Addictive Behaviors*, *140*, 107626. https://doi.org/10.1016/j.addbeh.2023.107626

Eben, C., Bőthe, B., Brevers, D., Clark, L., Grubbs, J. B., Heirene, R., Kräplin, A., Lewczuk, K., Palmer, L., Perales, J. C., Peters, J., Holst, R. J. van, & Billieux, J. (2023). The landscape of open science in behavioral addiction research: Current practices and future directions. *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2023.00052

Flayelle, M., Brevers, D., King, D. L., Maurage, P., Perales, J. C., & Billieux, J. (2023). A taxonomy of technology design features that promote potentially addictive online behaviours. *Nature Reviews Psychology*, *2*, 136–150. https://doi.org/10.1038/s44159-023-00153-4

Garrett, E. P., Drummond, A., Lowe-Calverley, E., & Sauer, J. D. (2023). Current loot box warnings are ineffective for informing consumers. *Computers in Human Behavior*, *139*, 107534. https://doi.org/10.1016/j.chb.2022.107534

Gearhardt, A. N., & DiFeliceantonio, A. G. (2023). Highly processed foods can be considered addictive substances based on established scientific criteria. *Addiction*, *118*(4), 589–598. https://doi.org/10.1111/add.16065

Griffiths, M. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10*(4), 191–197. https://doi.org/10.1080/14659890500114359

Grubbs, J. B., & Boness, C. L. (2025). Thinking beyond substances: Why behavioral "addiction" research must move past substance use disorder paradigms. *Journal of Psychopathology and Clinical Science*, *134*(2), 115–116. https://doi.org/10.1037/abn0000970

Ince, C., Gaudet, É., & Bőthe, B. (2025). Thinking beyond substances: The imprecision problem in behavioral addiction research and a necessary road map—Commentary on Grubbs and Boness (2025). *Journal of Psychopathology and Clinical Science*, *134*(6), 612–614. https://doi.org/10.1037/abn0001008

King, D. L. (2018). Comment on the global gaming industry's statement on ICD-11 gaming disorder: A corporate strategy to disregard harm and deflect social responsibility? *Addiction*, *113*, 2145–2146. https://doi.org/10.1111/add.14388

Musetti, A., Floros, G., Chiappedi, M., & Stavropoulos, V. (2025). Gaming disorder in the ICD-11: The state of the game. *BMC Psychiatry*, *25*(1), 1114. https://doi.org/10.1186/s12888-025-07576-8

Qu, D., Zhang, X., Wang, J., Liu, B., Wen, X., Feng, Y., & Chen, R. (2023). New form of addiction: An emerging hazardous addiction problem of milk tea among youths. *Journal of Affective Disorders*, *341*, 26–34. https://doi.org/10.1016/j.jad.2023.08.102

Sinclair, E. S.-L. L., & Clark, L. (2024). Gender gaps in publications and citations in gambling studies: Comparisons against addiction science. *Psychology of Addictive Behaviors*, *38*(6), 696–703. https://doi.org/10.1037/adb0000985

Starcevic, V., Billieux, J., & Schimmenti, A. (2018). Selfitis and behavioural addiction: A plea for terminological and conceptual

rigour. *Australian & New Zealand Journal of Psychiatry*, *52*(10), 919–920. https://doi.org/10.1177/0004867418797442

Targhetta, R., Nalpas, B., & Perney, P. (2013). Argentine tango: Another behavioral addiction? *Journal of Behavioral Addictions*, *2*(3), 179–186. https://doi.org/10.1556/jba.2.2013.007

van Rooij, A. J., Ferguson, C. J., Colder Carras, M., Kardefelt-Winther, D., Shi, J., Aarseth, E., Bean, A. M., Bergmark, K. H., Brus, A., Coulson, M., Deleuze, J., Dullur, P., Dunkels, E., Edman, J., Elson, M., Etchells, P. J., Fiskaali, A., Granic, I., Jansz, J., … Przybylski, A. K. (2018). A weak scientific basis for gaming disorder: Let us err on the side of caution. *Journal of Behavioral Addictions*, *7*(1), 1–9. https://doi.org/10.1556/2006.7.2018.19

Yeola, A., Allen, M. R., Desai, N., Poliak, A., Yang, K. H., Smith, D. M., & Ayers, J. W. (2025). Growing health concern regarding gambling addiction in the age of sportsbooks. *JAMA Internal Medicine*, *185*(4), 382–389. https://doi.org/10.1001/jamainternmed.2024.8193

Young, K. S. (2004). Internet addiction: A new clinical phenomenon and its consequences. *American Behavioral Scientist*, *48*(4), 402–415. https://doi.org/10.1177/0002764204270278

Zare-Bidoky, M., Baldacchino, A. M., Demetrovics, Z., Fineberg, N. A., Kamali, M., Khazaal, Y., Potenza, M. N., Stein, D. J., & Ekhtiari, H. (2025). Problematic usage of the internet: Converging and diverging terminologies and constructs. *Journal of Behavioral Addictions*, in press. https://doi.org/10.1556/2006.2025.00085

NOTE FROM THE COORDINATORS

Joël Billieux, Antonio Rial,
Abel Nogueira-López and Francisco Pascual

Writing the introduction to this Handbook demands of its Coordinators honesty, conciseness and talent, which at this point (the finish line after composing this volume of over 700 pages) becomes a truly difficult task. Despite the enormous satisfaction of having arrived at this stage, accompanied by exceptional researchers and individuals, condensing everything that this adventure has meant for us in a few clear and coherent paragraphs is notably challenging.

The first thing we want to emphasize is our pressing need, as a society, to engage in a calm, serious, and courageous reflection on the problem that fast-paced technological development experienced in recent years (and the voracious underlying business) has entailed for people's lives, especially for the younger generation. Without the intention of demonizing technology, it is clear to everyone that the increasingly early, frequent, intensive and unsupervised use of many digital applications or platforms is not proving harmless, especially for minors, and is negatively affecting different areas of their lives, including their physical health, mental health, cognitive development, and even school-family relationships. It is unjust to render children, adolescents, or their families as solely accountable for the negative trajectory of this reality. The industry has often treated minors exclusively as *customers*, instead of as especially vulnerable individuals who should be protected by design. For their part, administrations and politicians have not always been aware of the issue, have not been bold enough, or have been insufficiently committed to finding solutions. As researchers, we have the challenging task of analyzing reality with the utmost rigor and prudence, avoiding both trivialization and over-pathologization of the problem, convinced that evidence will help us identify the right path. *Action research*, as Kurt Lewin argued: *No research without action and no action without research*. A century later, that remains our great motto. Science (and scientists) at the service of society, in the strictest sense of commitment and social responsibility.

This handbook is structured in four main sections. The aim of the first section (*Conceptualizing and Measuring*), composed of 7 chapters (1–7), is to build a solid and clear knowledge base about the construct (or rather, the constructs) we are referring

to; the clinical, scientific and social reflection on new addictions, their epidemiology and correlates at both biochemical and brain levels. An overview of the main theoretical models through which they can be explained, together with the criteria that should be used for their evaluation and diagnosis, are presented and the risk of pathologizing our everyday life is explicitly cautioned against. Therefore, we proceed on the basis of criteria, rigor, and prudence.

In the second section (*Understanding*), also comprised of 7 chapters (8–14), the authors help us reflect on the problem from a more holistic perspective, convinced that this focus will enable a deeper understanding and a sound approach toward it. This part analyzes topics such as mental health and dual pathology, suicidal behavior among youth, and conflicts of coexistence during childhood and adolescence, *Problematic Gaming*, stigma, or the need to understand this pressing issue from a gender perspective. Non-substance addiction extends far beyond the sphere of addiction itself.

In the third section (*Prevention & Intervention*), again composed of 7 chapters (15–21), the key answers available to date in terms of both prevention and intervention are made available to professionals and researchers, with special attention given to the contexts of Spain and Latin America, as well as to different examples of good practices that have already proven useful. This section also provides an in-depth overview of topics such as mindfulness-based interventions, or the crucial role of pediatric services in early detection and intervention, while reflecting on the major challenges that lie ahead. What are we doing? How are we doing it? Furthermore, what else could we do?

This Handbook concludes with a final section consisting of 6 chapters (*Special Contributions*, 22–27) in which, guided by some of the world's leading experts, topics of particular interest are explored, such as the controversial *Loot boxes, the Binge-Watching phenomenon, Phubbing, Celebrity Worship, the Game Transfer Phenomena or Voluntary Self-Exclusion*.

We would like to thank all the people and institutions that have made this publication possible, and explicitly acknowledge Socidrogalcohol and the Government Delegation for the National Drugs Plan of Spain, the public entity Red.es, UNICEF Spain, the University of Santiago de Compostela and the Spanish General Council of Informatics Engineering who (within the framework of the *Digital Childhood* project) have provided the necessary economic and institutional support. The preparation of the Handbook has been financed exclusively with public funds from Spanish institutions. The contribution of each and every author has been completely altruistic, without any financial compensation. The 27 chapters are available in two languages (English and Spanish), for any researcher, professional or citizen concerned about this topic. Its use and application must be public and for collective benefit. We cannot conceive it otherwise.

If the *why* and *for what* are important, of no less significance are the *how* and *with who*. We are sincerely quite happy to have had the opportunity to share this experience with Professor Luke Clark (University of British Columbia), Francisca Sureda Llull (Government Delegate for the National Drugs Plan) and Jesús Herrero Poza (General

Director of Red.es). They have known better than anyone how to solemnly, competently, and affectionately author the prologues of this book. We feel especially privileged for the generosity shared by the 69 authors who have believed in the project from day one and have invested their time, enthusiasm and talent.

Many topics have been left unaddressed, which for one reason or another could not be included in this *Handbook of Non-Substance Addictive Behaviors*. We don't know if there will be a second edition. It's too early to tell. But what is certain is that we urgently need to start providing good answers to a contemporary problem. This is our humble contribution.

Thank you all.
Joël, Antonio, Abel and Francisco

A BIT OF HISTORY

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The first behavioral addiction recognized as such was gambling (pathological gambling). But gambling *per se* neither represents nor is a problem, since it is part of child development in all cultures and civilizations, allowing children to experience, discover and live experiences and being a basis for more elaborate knowledge (Calvo & Gómez, 2018). Present throughout human history, gambling comforts, entertains, and teaches, which makes it appealing, enabling children's holistic growth and development, provided that it is used correctly and with controlled objectives, times, and content.

Today, not only gambling but also social networks, the Internet, shopping or sex have also been evaluated as potential behavioral addictions (also called "non-substance addictions"), although most are not yet recognized as such in international classifications and treaties. In the case of gambling, it is considered a disorder and with potentially serious consequences, which is why it represents a significant problem at present.

Although just a few decades ago many of the game-playing modalities that are readily available today did not even exist, gambling has always been present in all societies, as a leisure or learning activity or as a means for socialization. From the ancient Egyptians with *senent*, to chess in the Middle Ages, to card games, or to *Parchís* and the *Game of the Goose*, games have been part of everyday life, without initially posing any problems. However, they have sometimes also been linked to monetary objectives (Steedman, 1996) and competitiveness, becoming a potentially addictive behavior. All these aspects have been important in defining and evaluating different types of games, depending on the objective pursued, including gambling games, which a priori are more problematic. Betting money or belongings, gambling and risking, ultimately, is related to impulsiveness and sometimes to a lack of control. Risky behaviors have always been pleasurable to humans, being associated with adrenaline and dopamine releases and triggering a certain degree of pleasure. It is well known that the release of these neurotransmitters is related to the search for pleasure, which makes these behaviors highly addictive. Games activate our brain's reward system, whether they are sports games, betting games, or simply entertainment games, and they usually carry a significant emotional release.

It is true that the types of games have changed throughout the history of humanity; games of skill, physical games, games of chance... children's games, until reaching our contemporary times, in which many games include the use of different digital devices, allowing playing with other people, even in the absence of their physical presence. The use of the Internet and new technologies has shaped the course of behavioral addictions in a very particular way.

The brain mechanism that causes addiction, as well as the brain structures involved, can lead to a lack of control over gambling behavior. It is very similar and may even be related to substance use or other types of addictive behaviors, since at a neurobiological level the behavior of brain structures and the participation of neurotransmitters is the same. While it is true that international treaties and classifications currently only include gambling addiction or pathological gambling (*Gambling*) and recently some behaviors related to Internet and video game use (*Gaming*), it is no less true that it is suggested that compulsive shopping, body worship, obsession with sex and other behaviors related to the search for pleasure could lead to possible addictive disorders. In contemporary society, these behaviors must be taken into account, not just for the future, but in the present moment, as potential behavioral addictions with which we must be very precise at a scientific, clinical, and social level, regardless of whether or not they are included in the different manuals or nosological classifications.

Since gambling addiction has been considered the first behavioral addiction, this first chapter presents a brief historical overview at what gambling has meant for humanity and how something that, in principle, could be absolutely harmless, has become a serious problem for many individuals.

1. HISTORY OF GAMBLING

During the Paleolithic period, humans used games in magical and divine rituals, integrating religious manifestations and also relating to cultural expressions (Calvo & Gómez, 2018). It is estimated that the first strategy games appeared around 4000 BC, using certain skills and tactics, in relation to certain sporting practices, rituals of chance and gambling games (Steedman, 1996). In the pyramid of Cheops, in Egypt around 3000 BC, a game was found that they called *Senet*, very common among adults. It is said that Pharaoh Tutankhamun liked it so much that he had himself buried with four boards and, although the rules have been lost, it is known that it was played by advancing pieces on a board of 30 squares, some of which were dangerous and others which brought luck (Steedman, 1996). Clay balls and wooden toys have also been found, and games such as the merry-go-round have been described, on which usually girls spun around, holding hands and pushing themselves by their heels. During that time, there were also boxing, wrestling, and fencing competitions. It is estimated that the first fencing tournament in history was held in 1250 BC. A very popular board game was *Snake*, so

called because the board was shaped like a coiled serpent. In this game, players started at the tail and had to try to move their pieces to the head of the snake, which was in the middle (Steedman, 1996).

In India, around 2000 BC, playing marbles already took place. And around the same time, the Maya and Aztecs used the ball to play, with well-established rules, for all ages and genders (Calvo & Gómez, 2018). Both in imperial China (from 2300 BC) and in India in 1500 BC, we can find references to various leisure games. Gambling may have originated in China, as a game of wooden pieces, probably a lottery, is described in the *Book of Songs*, between 1000-600 BC (Calvo & Gómez, 2018). Let us not forget either the games of physical development, so present in Greek culture, the *Olympics*; or in Roman culture, the circuses, coliseums and amphitheaters, with different types of competitions, in many cases even closely related to specific religious rituals. It was the Romans who possibly gave greater popularity to gambling and, in particular, to dice. Julius Caesar, Mark Antony, and Nero were great players, and especially Caligula. It is said that when he lost, he would have some rich person in the city arrested or executed in order to confiscate their property. Even the Bible mentions how the Roman soldiers played dice for keeping Christ's clothes after he was crucified. It was precisely the Romans who established the *ludi* (entertainment activities), which included chariot races and gladiatorial combats. They also had a "lottery" and bet large amounts of money on cockfights (McMckeever, 1966).

Although gambling has been present throughout history and in different cultures, its consequences became so problematic that, during the Third Crusade, King Richard the Lionheart even forbade gambling among his troops. In 1466, in Bruges (Belgium), a lottery was organized for the first time, but with a charitable purpose, since the profits were intended for the poor. In the second half of the 15th century, Louis XII (King of France) created a lottery to finance the construction of the Milan Cathedral, of which he was duke. In 1492, at the time of the "discovery" of America, it is known that playing cards was the most popular game. The different types of games, especially betting, gradually spread. Thus in 1520, King Francis I of France created the so-called *"white lottery"* which was later legalized in Venice and the United Kingdom. At that time, bets of all kinds were placed and people bet on almost everything, so much so that in 1590 Pope Gregory XIV went so far as to order excommunication for anyone who bet on the outcome of the conclave. In Spain, gambling expanded in a special way during Romanization, being permitted unrestrictedly until the 14th century.

The invention of the lottery is believed to be Italian, introduced to France by the Medici family, although it is also claimed that the first lottery actually appeared in Spain in 1276 under the reign of Alfonso X (Soto, 2014). On September 30, 1763, Charles III created the national lottery and, since then, it has been played uninterruptedly. Throughout the 19th century, some casinos were opened, generally located in spas and with roulette as the star among the games. It is said that Fyodor Dostoevsky suffered a pathological addiction to gambling, which led him to incur heavy debts at all of the gambling tables

in St. Petersburg. Pursued by creditors, with a family to support and bound by publishing commitments, he began a precipitous and feverish literary endeavor that would lead him to compose two of his best works in the same year: *The Gambler* and *Crime and Punishment* (1866).

Over history, problems provoked by gambling have had a public impact, given the serious consequences it generates. As an example, an article published in a local Spanish newspaper on August 8, 1903, titled *"The tragedies of gambling" (Heraldo de Alcoy, 1903):*

> *"A letter has been sent from Monte Carlo to a newspaper in Savona, reporting a terrible tragedy caused by losses at the roulette tables of that winter resort. In the room of one of the main hotels in Monte Carlo, the bodies of a young lady, a 15-year-old girl, and a 12-year-old boy were found, believed to be the children of the unfortunate lady. The police are maintaining strict secrecy as to what happened, as the hotel staff who could shed light on the matter have been threatened. It is only known that the unfortunate lady was German and that in recent days she had gambled large sums at the casino. Apparently, the day before she committed suicide she went to Nice, where she sold some bonds, the proceeds of which were again deposited in her gambling pot. Ruined, the unfortunate lady resorted to committing suicide. She committed suicide by asphyxiation and died in the company of her two children."*

Delving into this news article allows us to observe that some of the problems we face today are not actually new; something as basic and fun as playing games has, over the years, become a serious problem for society, which we call *gambling disorder*. The evolution of betting games and risk-taking has been gradual, but relentless. Since card games in the Middle Ages, there have been different types of games prohibited and prosecuted by law in different countries. An increase in gambling was observed in the 19th century, coinciding with the industrial revolution, with an important contextual role of the popular taverns. Betting games were created to help people with disabilities, sports betting, casinos and bingo halls, slot machines, new lotteries, and even the *EuroMillions* and so many other formats. In the 20th century, large casinos proliferated, and cities like Las Vegas base a major part of their economy on the gambling sector. At the end of the 20th century, gambling became digital, with a great upsurge and presence of online games. Among the youngest, video games become the gateway to the massive use of Information and Communication Technology (ICT) (Belli & López, 2008). The rise of video games and online gambling has created a new divide in the field of addictive behaviors, regardless of whether or not they entail monetary rewards.

The first video game dates back to 1952; a computerized version of *Tic-tac-toe*, which was called *Nought and crosses*. In 1958, *Tennis for two* was launched and in 1962 a technology student created *Spacewar*. Shortly thereafter, in 1966, what we could consider the first home video game was developed, called *Fox and Hounds*, played on the first home video game system (1972). However, the real revolution in the video game

industry occurred in the 1970s, with the appearance of the arcade machine *Pong*. From the 70s until the 90s, various home systems appeared from Phillips, Atari and Nec, among others, which meant an important boost for this new industry. Japan opted for home consoles like Nintendo, while Europe preferred microcomputers like Spectrum. From the 90s onwards, video game consoles were improved and given more power, with an increase in bits and the development of 3D. Portable video game consoles became extremely popular, with Nintendo's Game Boy leading the way. Later, in 2000, Sony launched PlayStation, and in 2005, Xbox 360 was released. The consoles supported DVD and later Blu-ray and HD quality (Belli & López, 2008). A large part of video games was based on *Beat 'em up* fighting, grappling, first- and third-person action games, combat simulations, racing, sports, adventure, but also mental agility, educational, and musical games... for all preferences and ages. All this rapid evolution has not only resulted in the booming growth of a new business sector, but has also given rise to a new diagnostic entity, such as *Gaming Disorder*, which is generating a great deal of controversy.

2. PATHOLOGICAL GAMBLING

Included in international classifications and traditionally related to a lack of impulse control, it is an addiction, with diagnostic criteria similar to substance use disorder, recognized as a nosological entity in the 20th century, with a multifactorial etiopathogenesis (De Noreña, et al., 2021). A key moment in the history of medicine was 1561, with the publication of *De Alea sive de curanda ludendi in pecuniam cupiditate* (*On Gambling*) by Pascasio Justus, describing the social problem generated by gambling and offering the first clinical recommendations, considering it as a mental problem, with ethical connotations, which Benjamin Rush (1785) later elaborated on (De Noreña, et al., 2021).

Gambling-related problems led to rules and legislation dating back to the time of the Greeks and Romans. In Rome the problem was so severe that even wealthy citizens could end up becoming slaves due to the great losses incurred. Laws, such as *Lex Cornelia, Lex Publicia* and *Lex Titia*, were passed prohibiting betting games, although sports betting remained legal (McMckeever, 1966). As early as 813, the Council of Mainz excommunicated gamblers. The prohibition extended into the Middle Ages as part of the Gregorian reform. In Spain in 1532, Doña Juana requested of the Courts of Valladolid the establishment of prohibitive laws. The owners of gambling venues were imposed *fines of 5,000 maravedis for each time a game was played and 100 days of imprisonment with subsidiary punishment, in addition to exile* (Bombín, 1992).

Unfortunately, legislative measures have not solved gambling-related problems, and it has continued to cause serious harm throughout history to both those who practice it and their families, who in some cases have seen their present and future ruined. It is advisable to continue implementing measures and learning from history, but above all we need to find solutions and help those who suffer from gambling addiction, an addictive

disorder for which we have made enormous progress in its treatment, but which we need to address with more and improved preventive policies (Pascual, 2021). Until very recently, the main problem was caused by slot machines, due to their availability, easy accessibility and low amounts, along with rich stimuli and attractive lights and sounds (Arias & Orio, 2024; Sirvent et al, 2023). It was believed that the only games that could cause addiction were games of chance, until video games appeared, sparking a shift in the conception of gambling addiction itself.

3. NON-SUBSTANCE ADDICTIONS: BEYOND GAMBLING

People generally seek to occupy their free time, combat idleness, or escape from their daily worries. In 1980, the diagnosis of gambling disorder was recognized in the DSM as a mental disorder, included in impulse control disorders, although it was a problem that had existed for a long time, as we have already seen. In the 1990s, talk began of possible addiction to sex and shopping (oniomania), coupled with an increase in the use of pornography and shopping, not included, not recognized at least for the moment in the statistical and diagnostic manuals. These conditions are sometimes linked to anxiety disorders, substance abuse, and even eating disorders (Pérez de Rio, 2011). Also, in the 1990s began the emergence of what was then called "new technologies" or ICTs (Information and Communication Technologies), and since then, problems related to their use also appeared. In the 2000s, things got more complicated, with the rise of the Internet and new digital media. People wanted what was practical, useful, quick, and immediate, and if it could come with a reward, all the better, whether monetary or not. The use of social networks is becoming globalized, from an early age, and with it the need to interact and to show oneself to others. What could possibly be referred to as "Internet abuse" and "Technophilia", which no one knows at the moment if should also be considered an addiction, appeared. This is an interesting open debate, which allows us to analyze the different aspects of a problem that continuously increased over the last decade. There is talk of a *pseudodisorder*, of lack of control, of the need for diverse therapeutic approaches, as well as of progress. Where can we draw the line between the what is pathological and what is not? Do Internet addiction and technology addictions really exist? What about addiction to mobile phones, social media, pornography, or shopping? How about exercise or work addiction (workaholism)? Can any human behavior lead to addiction? What's behind all of this? Could it perhaps be a lack of impulse control, an adaptive or maladaptive response to certain emotional, affective, or even existential voids?

Close attention needs to be paid to the evolution of society and the role that each one of us assumes. The new guidelines point to pathological gambling, online gambling, especially among adolescents, mobile phones, video games, the Internet, social networks, compulsive shopping, sex and pornography, eating, and even emotional or

affective dependence. The WHO is already warning that one in four people may suffer from a disorder related to non-substance addictions. It is advisable to assess it consciously, scientifically, and with moderation. Let's delve into the different chapters of this manual to try to find some answers.

REFERENCES

Arias, F y Orio L. (Coordinadores) Guía clínica sobre adicciones comportamentales, basada en la evidencia. SOCIDROGALCOHOL. Martin gráfics 2024

Belli, S.; López Raventós, C. Breve historia de los videojuegos. Athenea Digital. Nº 14: 159-179 (otoño 2008)

Bombín Blas. El juego de Azar. Patología y Testimonio. Junta de Castilla y León. 1992.

Calvo Hernando, P y Gómez Gómez. Aprendizaje y juego a lo largo de la historia. La Razón Histórica, nº 40, 2018 (23-31) ISSN 1989-2659. Instituto de Política Social.

Steedman, Scott. El imperio egipcio. Gran enciclopedia de bolsillo. Edit. Molino. 1996

De Noreña, D.; Muñoz, A.; Ezpeleta, D.; Latorre, G. Juego patológico: historia y bases neuroanatómicas y fisiopatológicas. Kranion. 2021: 16: 123-30.

Dostoievski. El Jugador. 1866. Alianza editorial.

Heraldo de Alcoy. 8 agosto 1903.-

McMckeever, Susan. El imperio Romano. Gran enciclopedia de bolsillo. Editorial Molino. 1966

Pascual Pastor, F. Problemas del juego el S. XIX. Lilia Nº 34. Pags. 106 – 107. Archicofradía Virgen de los Lirios Alcoy. 2021.

Pérez del Rio, F. Las adicciones sin sustancia en estos últimos 40 años. Norte de salud mental, 2011, vol. IX, nº 40: 47-56.

Sirvent et alt. Guía de adicciones comportamentales (manual para profesionales). Departamento de publicaciones de Fundación Instituto Espiral, 2023

Soto, Juan. https://lazancadilla.com/2014/11/la-aguja-del-dinero-en-el-pajar-de-la-suerte/

I

CONCEPTUALIZING AND MEASURING

1

PATHOLOGIZATION OF EVERYDAY LIFE AS BEHAVIORAL ADDICTION

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ABSTRACT:

The pathologization of normal everyday activities as behavioral addiction has followed a general trend of pathologizing human suffering and distress. Two forms of pathologization in this realm are outlined. First, "new" behavioral addictions have been created based on the notion that certain normal activities are addictive when people are engaged in them excessively. Second, there has been a lowering of the threshold for considering some behaviors pathological, often in combination with use of the diagnostic criteria that do not necessarily denote addiction. As primarily a social process, pathologization reflects the dominant social trends. Various stakeholders, including clinicians, researchers, afflicted individuals and their families, have wittingly or unwittingly fostered pathologization. The key negative consequence of the pathologization of normal behavior is the stigmatization of that behavior, which promotes moral panic. Another concerning consequence is subjecting to therapeutic interventions people with "excessive", but otherwise normal behavioral involvement. Inclusion of normal behavioral patterns within behavioral addiction diagnoses has made these psychopathological entities too heterogeneous and undermined their validity. Pathologization can be countered by raising awareness of it and by prioritizing the development of valid definitions of addiction and behavioral addiction and research on better demarcation between normal and pathological activity engagement.

KEYWORDS:

behavioral addiction, normal behavior, psychopathology, pathologization, medicalization, stigmatization

1. INTRODUCTION

Engagement in a multitude of activities is what characterizes us as human beings. Every day, many or most of us work, study, exercise or become involved in recreational activities. We usually spend some time shopping and communicating with family and friends by phone or via social networks. In our "downtime", we watch our favorite TV shows, listen to music or perhaps play videogames. These and other activities meet our needs, enrich our lives and provide much of the meaning to our existence.

A well-balanced life is often assumed to mean that the person is not disproportionately engaged in any activity to the neglect and exclusion of others. The problem with this assumption is a lack of the absolute criteria for determining what constitutes "proportionate" and "disproportionate". For example, concert pianists and elite athletes are usually not considered to have imbalanced lives because they spend such a "disproportionate" time rehearsing, practicing and preparing for the next concert or sporting event so that there is little or no room for shopping, watching TV or playing videogames. Accordingly, concert pianists and elite athletes are not thought of being "addicted" to music or sport that they play, which may be related to the fact that they also tend to be highly successful individuals who make a living from playing music or sport. In other words, activity imbalance is not judged to reflect a problematic, pathological or addictive behavior if the main activity engagement has a stamp of social acceptance and approval.

There seems to be a different standard when judging time-consuming pursuits that do not bring socially praised rewards. Thus, judgements are quickly passed on people who seem to be "too engaged" in social networking, online sexual activities or gaming and they are labelled as "addicted" to these activities. One of the key arguments for this labelling is a "disproportionate" activity involvement to the exclusion of other activities —the argument that is completely ignored if activities of concert pianists and elite athletes are scrutinized.

These examples illustrate some of the problems with current conceptualization of behavioral addictions. The key issue is a lack of the valid criteria for clearly distinguishing between high (or passionate) and pathological (or addictive) involvement in many everyday activities. This amplifies general arbitrariness with which "excessive" behaviors are approached. Perhaps it is no wonder that on this background, a tendency to pathologize everyday activities as behavioral addictions is so rampant.

This chapter will first address a general tendency to pathologize human distress and behavior and will then focus on the ways in which the pathologization of normal activities as behavioral addiction occurs. Our attention will then turn to the causes, consequences and implications of this phenomenon. Finally, we will discuss efforts to counter and reduce pathologization.

2. WHAT IS PATHOLOGIZATION?

Pathologization is the process of transforming normal phenomena and behaviors into mental health problems or disorders that require professional, usually medical attention and help. Hence pathologization has often been used interchangeably with the term "medicalization" (Conrad, 2007). However, medicalization is a broader concept, encompassing a variety of health issues, for example the risk of developing cancer that leads to vigorous screening, early detection and diagnosis and then possibly overdiagnosis. Also, medicalization may not be appropriate in the context of mental health because of its imposition of a restrictive medical framework and underlying assumption that only medical professionals pathologize psychological normality. The term "overpathologization" denotes the same process as pathologization and has usually referred to mental health issues. In this chapter, we do not use overpathologization because it may erroneously imply that a certain extent of pathologization is acceptable and that the problem only occurs if there is "too much" pathologization.

A key assumption of pathologization is that the activity or phenomenon deemed to be normal is, in fact, not normal and that it constitutes a disorder or disease and therefore needs to be subjected to corrective action, i.e., intervention or treatment. Given this conceptualization, pathologization involves experiences (e.g., intrusive thoughts) and behaviors (e.g., avoidance) that lie on a continuum from normality to psychopathology. For the most part, pathologization is a social process, and various stakeholders play a part in it.

The pathologization of human suffering and distress is not a new development. Various human experiences that are a part of normal everyday life have been pathologized. Thus, normal sadness, especially if more intense or prolonged, has often been considered to reflect depressive illness (e.g., Horwitz & Wakefield, 2007). Likewise, normal varieties of fear, worry and anxiety have been construed as anxiety disorders (e.g., Horwitz & Wakefield, 2012). A long-standing tendency to pathologize grief and

bereavement has culminated in a recent introduction into the diagnostic and classification systems (Eleventh Revision of the International Classification of Diseases [ICD-11; World Health Organization, 2018] and Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders, Text Revision [DSM-5-TR; American Psychiatric Association, 2022]) of a "novel" mental disorder labelled "prolonged grief disorder" (e.g., Wada, 2022). Stressful experiences and responses to trauma have also been subjected to pathologization (e.g., Stein, Seedat, Iversen & Wessely, 2007), for example by broadening the definition of trauma so that a person could develop posttraumatic stress disorder following a vicarious exposure to trauma (Breslau & Kessler, 2001).

A thorough critique of contemporary psychiatric diagnoses is beyond the scope of this chapter. In the context of pathologization, it suffices to point out that the "territory" covered by depressive, anxiety and trauma- and stressor-related disorders appears to be much larger now than several decades ago. The prevalence of these conditions in the general population has increased dramatically (e.g., Moreno-Agostino et al., 2021), which may to a large extent be due to pathologization considering that the corresponding diagnostic categories now also encompass varieties of normal experience.

3. MANIFESTATIONS OF THE PATHOLOGIZATION OF NORMAL ACTIVITIES AS BEHAVIORAL ADDICTIONS

The pathologization of normal behavior as behavioral addiction is a more recent phenomenon that parallels the rise of behavioral addictions as an area of an increasing professional, scientific and societal interest. At least two types of pathologization can be identified here. The first is the creation of "new" behavioral addictions. The second type, which has been extensively examined in the field of online gaming, pertains to the lowering of the threshold for considering certain behaviors addictive, often combined with diagnostic criteria that may not necessarily characterize addiction.

3.1 Creation of "new" behavioral addictions

The first type of pathologization refers to everyday life activities, generally regarded as innocuous or even healthy, which are deemed "eligible" to be encompassed by the concept of behavioral addiction if people indulge in them "excessively" and with certain detrimental consequences. Although cases of addiction to such activities have been described, the scientific and professional community remains by and large skeptical about the validity of these "novel" behavioral addictions. Examples of such conditions include tanning addiction (Ashrafioun & Bonar, 2014), fortune telling addiction (Grall-Bronnec, Bulteau, Victorri-Vigneau, Bouju & Sauvaget, 2015), dance addiction (Maraz, Urbán, Griffiths & Demetrovics, 2015), love addiction (Earp, Wudarczyk, Foddy & Savulescu, 2017) and addiction to mountaineering (Habelt et al., 2023), among others.

The process of pathologization conforms to the pattern first described in a seminal work by Billieux and colleagues (2015). These authors have suggested that the creation of new behavioral addictions uses an atheoretical and confirmatory approach and consists of three steps. First, a particular behavior is *a priori* considered to have addictive potential and is a "substrate" for a new behavioral addiction. Second, a self-report screening instrument for detection of this behavioral addiction is developed on the basis of the substance abuse and dependence criteria (with individuals scoring above the instrument cut-off point deemed to be addicted). Finally, studies are conducted to ascertain whether known risk factors for and correlates of substance addiction are also associated with the new behavioral addiction, apparently in an effort to demonstrate the validity of the latter.

All steps in this process are fraught with flawed reasoning. With regards to the first step, why are some activities addictive, while others are "potentially" addictive or nonaddictive? If climbing mountains and dancing are addictive, why would bicycle riding and walking not be addictive? Is it because no one has published a paper (yet) on "bicycle riding addiction" and "walking addiction"? Is the notion that *any* rewarding/appetitive behavior is addictive or can become addictive endorsed by the scientific community? Is it based on research or some consensus among different groups of experts? Or is it just a personal opinion? There is an ongoing debate about the criteria for determining addictiveness of various behaviors and for establishing diagnoses of new behavioral addictions. For example, clinical relevance, theoretical embedding and empirical evidence were the criteria postulated by Brand et al. (2022), whereas Gullo, Wood and Saunders (2022) suggested compatibility with the phenomenology of addiction and taxonomic plausibility as the criteria in addition to clinical relevance and theoretical embedding.

In terms of the questionnaires, they are usually developed with an erroneous assumption that substance addiction diagnostic criteria are interchangeable with those for behavioral addiction (Flayelle et al., 2022) and that similarities between substance and behavioral addictions are more important than their differences (Griffiths, 2017). Relatedly, many instruments have been constructed on the basis of the components model of addiction (Brown, 1993; Griffiths, 2005), with a tendency to pathologize normal activities as behavioral addiction (Fournier et al., 2023).

The final step in the pathologization process implies that substance addiction and behavioral addiction share the same or very similar psychopathology if some or many of their biological and psychosocial correlates and associated risk factors are also similar. This reasoning reflects a confirmatory approach, with a set of presumably validating, but interrelated parameters being chosen in advance and cross-sectional studies then easily confirming a hypothesis about the "closeness" of substance and behavioral addictions. However, the lack of specificity in these correlational analyses might have also led to a conclusion about a close link between behavioral addictions and other forms of psychopathology, perhaps most notably impulse-control disorders (e.g., Starcevic, 2016).

3.2 Lowering of the threshold for considering everyday activities addictive and use of the diagnostic criteria that do not necessarily denote addiction

The second type of pathologization also follows the adage "everything in moderation, nothing in excess". It is about ordinary activities (such as online gaming or consuming pornography) that can become problematic when performed excessively and when associated with negative consequences. However, unlike the "new" behavioral addictions, some of these problematic activities have already been recognized as mental disorders and included in nosography manuals. For example, internet gaming disorder (IGD) is included as a "condition for further study" in DSM-5 (American Psychiatric Association, 2013) and DSM-5-TR (American Psychiatric Association, 2022), while gaming disorder (GD) and compulsive sexual behavior disorder appear in ICD-11 (World Health Organization, 2024).

This form of pathologization is manifested when intense, but healthy activity involvement is considered problematic or addictive and is thought to constitute a disorder via lowering of a diagnostic threshold (see Billieux et al. (2019) in the context of gaming). Thus, pathologization here refers to a boundary between normal and pathological or between nonaddictive and addictive, with that boundary being moved in a way that the pathological and addictive encompass manifestations that were hitherto thought to belong to the realm of normal and nonaddictive.

Lowering of the diagnostic threshold so that variants of normality are reconceptualized as psychopathology has also been the main mechanism by means of which sadness and fear have been transformed into depression and anxiety disorders, respectively. When it comes to online gaming or sexual behaviors, there is almost a broad consensus that these activities at some point become pathological or addictive; however, where this point can be located has been a matter of controversy (Castro-Calvo et al., 2022; van Rooij et al., 2018). A key manifestation of pathologization here is the imposition of an arbitrary and relatively low threshold or cut-off, frequently in terms of the time spent in the activity (or sometimes "screen time"). If the time spent performing such an activity is over a presumed threshold, the activity is considered pathological and addictive, without necessarily taking into account other features of psychopathology and addiction. In the context of gaming, this reasoning has been demonstrated to be flawed because time alone was not a reliable predictor of problematic gaming (Király et al., 2017).

Diagnostic thresholds for IGD and GD have been compared in a number of studies and the threshold for IGD was consistently found to be lower than the threshold for GD (Borges et al., 2021; Higuchi et al., 2021; Jo et al., 2019; Ko et al., 2020; Starcevic et al., 2020; Tuncturk et al., 2023). These studies have also reported that rates of IGD were higher than rates of GD, with a substantial number of individuals with IGD not qualifying for the diagnosis of GD. All this suggests that IGD criteria might be more prone to pathologization than GD criteria (Billieux et al., 2019; Nogueira-López et al., 2023).

In the context of gaming, some frequently used diagnostic criteria, also incorporated in many screening and assessment tools and directly inspired from substance

use disorder criteria, do not perform well to distinguish between pathological and non-pathological gaming (e.g., Charlton & Danforth, 2007; Deleuze et al., 2017; Griffiths et al., 2016), which contributes to pathologization. These criteria include preoccupation with gaming, gaming as a form of escape and loss of interest in previous hobbies and entertainment (as a result of gaming). As they also characterize normal gaming, such criteria may pathologize gaming that extends over longer periods of time and should not count towards the diagnosis of pathological gaming.

Furthermore, studies have made a distinction between the "core" (e.g., loss of control, ongoing gaming despite negative consequences) and "peripheral" (e.g., preoccupation with gaming, tolerance) criteria for pathological gaming, with the latter being non-specific for pathological gaming and also characterizing normal patterns of gaming (Charlton & Danforth, 2007; Deleuze et al., 2017). From this perspective, mixing of the core and peripheral criteria that have the same diagnostic value in a polythetic system is a plausible explanation for a tendency of the IGD criteria to pathologize gaming, in contrast to the more "conservative" approach (such as the one used by ICD-11 for its GD conceptualization) that includes for the most part core criteria in a monothetic system where all have to be present for the diagnosis to be made (Billieux et al., 2019). Finally, a Delphi consensus study comprising 29 international problematic gaming experts has reported that only a few diagnostic criteria from the ICD-11 and DSM-5 frameworks are able to distinguish problematic from normal gaming and therefore had clinical utility: impaired control over gaming, continuation of gaming despite harms, significant impairment due to gaming and conflict or interference as a result of gaming (Castro-Calvo et al., 2021).

It is concerning that pathologization of normal behavior as behavioral addiction is embedded in assessment tools. For example, one review of screening instruments for problematic gaming and GD reported that many of these questionnaires contained at least one item that might pathologize normal gaming, such as changes in mood when gaming, desire to play videogames or continue gaming and experiencing immersion during gaming (King et al., 2020). Analogous to the way in which the DSM-5/DSM-5-TR system mixes the core and peripheral symptoms of addiction in defining IGD, a questionnaire developed to assess "social media addiction" and based on the components model of addiction was also found to conflate the core or central and peripheral features of addiction, thereby pathologizing normal use of social media as addictive (Fournier et al., 2023).

4. CAUSES OF PATHOLOGIZATION

The pathologization of normal behavior as behavioral addiction is a consequence of several converging factors. Some of them reflect certain trends in modern Western societies, for example a view that human behavior can largely be understood as a pursuit of

rewards. According to this view, almost everything that humans do is driven by reward seeking. If people are "excessively" involved in certain activities, that is assumed to be a consequence of a distorted reward-seeking dynamic, perhaps because rewards have not been attained despite a sustained effort or because the "number" of rewards attained has not been sufficient. Given that addiction is also presumed to be caused by a cycle of spiraling dysregulation of brain reward systems (Koob & Le Moal, 2001) and more broadly to reflect the vicissitudes in pursing the rewards (e.g., Volkow, Michaelides & Baler, 2019), these "excessively" performed activities are then considered to denote addiction.

A modern focus on addiction as an explanatory framework is in contrast to the explanations of abnormal behaviors in the past. For example, the concept of "monomania", popular in France in the early 19th century, was based on the notion of a morbid preoccupation with a single activity or theme, which resulted in "partial insanity" (Berrios, 1996; Eigen, 1991). Conditions such as erotomania, pyromania and kleptomania were all believed to suggest insanity and were not interpreted as pursuits of a sexual reward (erotomania) or gratifications derived from fire setting (pyromania) or stealing (kleptomania). If we lived in the 19th century France, gaming addiction, shopping addiction and exercise addiction would perhaps be called "gaming mania", "shopping mania" and "exercise mania", respectively.

As already mentioned, a number of stakeholders may promote pathologization of normal behavior as behavioral addiction, although they do not necessarily do so deliberately. The stakeholders include clinicians, researchers, afflicted individuals (patients) and families of these individuals.

The pathologization of normal behavior as behavioral addiction expands the professional turf and calls on the authority of addiction specialists and mental health professionals. According to Horwitz and Wakefield (2007, p. 213), "all professions strive to broaden the realm of phenomena subject to their control, and whenever the label of disease is attached to a condition, the medical profession has the primary claim to jurisdiction over it". It cannot be excluded that at least some addiction specialists and mental health professionals contribute to pathologization because it increases their influence and power. Furthermore, practicing clinicians may support (wittingly or unwittingly) pathologization because that process legitimizes the conceptualization of "excessive" behaviors as diagnosable and potentially treatable conditions for which reimbursable clinical services could be provided. Researchers may welcome diagnostic labelling of "excessive" behaviors because it offers a stronger and socially accepted foundation for their research and may increase opportunities for publications based on that research.

Some afflicted individuals may promote pathologization because a diagnosis attached to their "excessive" behavior provides them with several benefits. The first is a release from responsibility for engaging in the behavior because such behavior is a consequence of the "disorder", not an expression of these individuals' free will and choice. The next benefit is an altered perception of oneself as a "victim" of the illness and relatedly, an acquisition of the "sick role" that entitles the person to receive treatment and social

support. Thus, the pathologization can transform a socially disapproved or even condemned "excessive" behavior into a socially acceptable disorder narrative. Families of afflicted individuals and their formal or informal support networks and advocacy groups may inadvertently welcome pathologization because a disorder narrative may be more acceptable, especially if the alternative is an uncomfortable consideration of families' potential role in the occurrence of an "unwanted" and "excessive" behavior.

There is one additional factor that may foster the pathologization of everyday life as behavioral addiction. It could be called "conceptual sloppiness" and has to do with a surprising fact that professional organizations and institutions have not come up with a widely accepted conceptualization of addiction. For example, DSM-5-TR eschews a definition of addiction on the grounds that it is "uncertain" (American Psychiatric Association, 2022, p. 543), while using the term "addictive" to refer to substance-related and addictive disorders. It is reasonable to ask what addictive is if it is "uncertain" what addiction is. Previously, it was noted that the conceptualization of addiction was broad and fuzzy and that it posited a relatively low threshold for considering behaviors addictive (e.g., Alexander, 2008). Likewise, the conceptualization of behavioral addiction has suffered from ambiguities (e.g., as noted by Kardefelt-Winther et al., [2017]). Given this context, use of the terms "addiction" and "addictive" has been rather loose, allowing the pathologization of normal behavior as behavioral addiction to flourish.

5. CONSEQUENCES OF PATHOLOGIZATION

The most obvious consequence of the pathologization of normal behavior is the narrowing of the range of what is considered normal and socially acceptable (Conrad, 2007) and stigmatization of that behavior. For example, everyone playing videogames for more than four hours per day may be considered to be "addicted", while gaming is stigmatized because it can be addictive. This may lead to moral panic —blanket prohibitions of gaming for individuals of certain age and in certain settings, whereas regular or passionate gamers have to constantly justify their gaming and withstand accusations of being engaged in a dangerous activity. Depriving people of the opportunities to engage in their healthy or recreational activities (e.g., gaming) has been interpreted as a violation of their human rights, especially in vulnerable populations such as children and adolescents (Stoilova, Livingstone & Kardefelt-Winther, 2016).

Inclusion of normal behavioral patterns within behavioral addiction diagnoses creates enlarged and excessively heterogeneous psychopathological entities. These entities encompass a spectrum of clinical presentations ranging from negligible or very mild to severe. Individuals with vastly different clinical presentations receive the same diagnosis, which might erroneously imply a need for the same or very similar therapeutic interventions, regardless of the severity of the problem and any functional impairment (e.g., Schimmenti, 2023). Thus, people with normal activity engagement who end up being diagnosed with

addiction may be pressured to undergo treatment. Of course, under no circumstances would an intervention designed to curb normal behavior be ethically acceptable.

Another consequence of the pathologization of normal behavior as behavioral addiction pertains to the use of the diagnostic criteria for enlarged psychopathological entities in epidemiological studies. Such criteria produce spuriously elevated rates of behavioral addictions in the community, with alarming implications. For example, these "false epidemics" (manufactured by screening/diagnostic tools developed on the basis of a confirmatory approach as outlined previously) might be used to further justify restrictions on certain behaviors. Also, such troublesome epidemiology might strengthen an erroneous notion that some behavioral addictions were "missed" in the past because the previous diagnostic criteria were too strict and the conditions were therefore under-diagnosed and under-treated. The priority may thus become not to miss the "true cases", regardless of the cost. According to this line of reasoning, over-diagnosis might be preferable to under-diagnosis, lowering of the diagnostic threshold should probably continue and at least for screening purposes, "false positives" (resulting from lowering the diagnostic thresholds) might be less harmful than "false negatives" (resulting from raising the diagnostic thresholds). Routinely identifying pathology where there is none is a natural extension of this process. This approach is in contrast to a thorough assessment of the advantages and disadvantages of including and excluding specific diagnostic criteria (Boyko, 1994).

Individuals who are erroneously diagnosed with a specific behavioral addiction may develop an expectation that their "problem behavior" will be taken care of by mental health or medical professionals. An adoption of this passive attitude undermines these individuals' sense of agency and leads to a notion that it is socially desirable to "surrender" to the authority of the professionals. Moreover, attribution of an "excessive" behavior to a mental disorder (i.e., behavioral addiction) may lead to ready-made but inaccurate explanations for such behavior (e.g., "The illness made me indulge in sex too much and affected my judgement"), damage to self-reliance and resilience, reduced sense of personal responsibility (especially when behavior has resulted in legal problems) and boost to the culture of complaint and blame (e.g., through compensation claims or litigation).

A further problem arising from the pathologization of normality is an allocation of scarce mental health resources to healthy or minimally ill individuals who do not need the services or who need them less at the expense of severely ill people who need the services much more. This represents a gross violation of the principle of equity.

Finally, the pathologization of everyday life as behavioral addiction will result in the erosion of public trust in psychological science, psychiatry and mental health professionals and addiction specialists involved in diagnosing and treating people with behavioral addictions. The very concept of behavioral addiction is likely to be questioned and come under attack. Furthermore, a perception that psychiatric diagnoses are arbitrary and that psychiatry and clinical psychology continue to embrace "diagnostic expansionism" (Hofmann, 2022) will only be strengthened.

6. OVERCOMING PATHOLOGIZATION

There is no easy and quick solution to the pathologization of normal behavior as behavioral addiction and proliferation of behavioral addiction diagnostic categories as psychopathological entities. Pathologization is mainly a social process and changing the dominant social trends that favor pathologization may seem like a Herculean task. Likewise, changing the attitudes and behaviors of stakeholders who play a major role in fostering pathologization will not be any easier. Nevertheless, there are measures that could be taken to keep the pathologization in check and promote "depathologization".

The first task in depathologization is raising awareness of pathologization. This is because pathologization has been so embedded in theoretical approaches to behavioral addictions, some diagnostic criteria and assessment tools that noticing it may be difficult. Raising awareness means being open to inquiries, asking questions and re-examining the concepts, theories, diagnostic thinking and means of assessment. Studies are then needed to test the performance of both the theory and practical tools (diagnostic criteria and assessment instruments) in distinguishing between normal and addictive behavioral patterns. Whatever fails to make this distinction should be considered susceptible to pathologization and should therefore be disqualified from serving as a feature of and diagnostic criterion for behavioral addictions. An example of this approach is the exclusion of the questionable IGD diagnostic criteria from the ICD-11 conceptualization of GD. Findings of such research should be widely publicized to inform both the stakeholders and general public and provide empirical evidence for depathologization.

A well-coordinated effort is needed to minimize pathologization via development of valid definitions of addiction and behavioral addiction. This entails a thoughtful integration of theory and empirical studies —something that has been missing so far from the work on conceptualizing and defining behavioral addiction. For example, a definition of behavioral addiction put forward by Kardefelt-Winther et al. (2017), amended by Billieux et al. (2017) and simplified by Starcevic (2018) has not been put to a test. There is a sense of urgency in undertaking this work because the field will continue to suffer from embarrassing ambiguities if behavioral addictions are not delineated, if their boundaries vis-à-vis normality and other conditions are not clearly outlined and if their relationships with "neighboring" psychopathology (e.g., impulse-control disorders) are not elucidated.

The success in countering pathologization will be directly proportional to the ability to distinguish between addictive and normal, especially intense but otherwise healthy, activity engagement. Achieving this can only result from the mobilization of all resources that the field has at its disposal.

7. CONCLUSION

We live in interesting times. While there has been a trend to normalize certain behaviors (e.g., some forms of paraphilia; Joyal & Carpentier, 2017) that have traditionally been considered to denote psychopathology, the opposite tendency —pathologization of normal behavior as behavioral addiction— has been developing at an alarming rate. This observation serves as a good illustration for the assertion that pathologization is very much a social phenomenon and thus, subject to the dominant social forces.

There is something deceptively simple and straightforward about labelling "excessive" behaviors as addiction. This labelling often appears self-evident and may even imply that it does not need to be challenged and that there is no need for further investigation. Perhaps this is a result of a perpetual tendency to reduce complex or poorly understood phenomena and behaviors to "manageable" concepts. Such reductionist approach by the relevant stakeholders is largely responsible for the pathologization of everyday life as behavioral addiction.

We have outlined two main forms of pathologization of normal behavior as behavioral addiction. First, it is the creation of "new" behavioral addictions. Second, pathologization entails lowering of the threshold for considering ordinary activities addictive, often in conjunction with use of the diagnostic criteria that do not necessarily characterize addiction. Although the pathways to pathologization are somewhat different, the outcome is the same —encompassing the variants of normal behavior under the "banner" of behavioral addiction. Numerous negative consequences of the pathologization include stigmatization of normal behavior, harm arising from "treatment" of that behavior, introduction of flawed psychopathological entities and damage to the credibility of psychiatry, psychological science, mental health professionals and addiction specialists.

Depathologization of normal behavior will aim to return pathologized behaviors to normality and restore the concept of behavioral addiction so that it only encompasses repetitive behaviors with both impulsive and compulsive features, which persist despite their detrimental consequences, significant impairment or distress (Starcevic, 2016; 2018). As such, depathologization is a worthwhile endeavor, but the one that will take much effort and time. While changes at the societal level that may limit pathologization are likely to be slow, the profession has a duty to act fast. This action should aim to improve the conceptualizations of addiction and behavioral addiction and delineate the boundaries between normal and problematic or addictive behaviors. Future research would do well to prioritize these aims.

REFERENCES

Alexander, B. K. (2008). *The globalisation of addiction: A study in poverty of the spirit*. New York: Oxford University Press.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th edition). Washington, D.C.: American Psychiatric Publishing.

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th edition text revision). Washington, D.C.: American Psychiatric Association Publishing.

Ashrafioun, L., & Bonar, E. E. (2014). Tanning addiction and psychopathology: Further evaluation of anxiety disorders and substance abuse. *Journal of the American Academy of Dermatology*, *70*(3), 473-480. doi: 10.1016/j.jaad.2013.10.057.

Bentall, R. P. (2003). *Madness explained: Psychosis and human nature*. London: Penguin Books.

Berrios, G. E. (1996). *The history of mental symptoms: Descriptive psychopathology since the nineteenth century*. Cambridge: Cambridge University Press.

Billieux, J., Flayelle, M., Rumpf, H.-J., & Stein, D. J. (2019). High involvement versus pathological involvement in video games: A crucial distinction for ensuring the validity and utility of gaming disorder. *Current Addiction Reports*, *6*(3), 323-330. https://doi.org/10.1007/s40429-019-00259-x.

Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, *4*(3), 119-123. doi: 10.1556/2006.4.2015.009.

Billiuex, J., van Rooij, A. J., Heeren, A., Schimmenti, A., Maurage, P., Edman, J., Blaszczynski, A., Khazaal, Y., & Kardefelt-Winther, D. (2017). Behavioural Addiction Open Definition 2.0 – Using the Open Science Framework for collaborative and transparent theoretical development. *Addiction*, *112*(10), 1723-1724. doi: 10.1111/add.13938.

Borges, G., Orozco, R., Benjet, C., Martinez Martinez, K. I., Contreras, E. V., Jimenez Perez, A. L., Pelaez Cedres, A. J., Hernandez Uribe Lic, P. C., Covarrubias Diaz Couder, M. A., Gutierrez-Garcia, R. A., Quevedo Chavez, G. E., Albor, Y., Mendez, E., Medina-Mora, M. E., Mortier, P., & Ayuso-Mateos, J. L. (2021). (Internet) gaming disorder in DSM-5 and ICD-11: A case of the glass half empty or half full. *Canadian Journal of Psychiatry*, *66*(5), 477-484. doi: 10.1177/0706743720948431.

Boyko, E. J. (1994). Ruling out or ruling in disease with the most sensitive or specific diagnostic test: Short cut or wrong turn? *Medical Decision Making*, *14*(2), 175-179. doi: 10.1177/0272989X9401400210.

Brand, M., Rumpf, H.-J., Demetrovics, Z., Müller, A., Stark, R., King, D. L., Goudriaan, A. E., Mann, K., Trotzke, P., Fineberg, N. A., Chamberlain, S. R., Kraus, S. W., Wegmann, E., Billieux, J., & Potenza, M. N. (2022). Which conditions should be considered as disorders in the International Classification of Diseases (ICD-11) designation of "other specified disorders due to addictive behaviors"? *Journal of Behavioral Addictions*, *11*(2), 150-159. doi: 10.1556/2006.2020.00035.

Breslau, N., & Kessler, R. C. (2001). The stressor criterion in DSM-IV posttraumatic stress disorder: An empirical investigation. *Biological Psychiatry*, *50*(9), 699-704. doi: 10.1016/s0006-3223(01)01167-2.

Brown, R. I. F. (1993). Some contributions of the study of gambling to the study of other addictions. In W. R. Eadington & J. Cornelius (Eds.), *Gambling behavior and problem gambling* (pp. 241-272). Reno: University of Nevada Press.

Castro-Calvo, J., Flayelle, M., Perales, J. C., Brand, M., Potenza, M. N., & Billieux, J. (2022). Compulsive sexual behavior disorder should not be classified by solely relying on component/symptomatic features: Commentary on Sassover & Weinstein (2021). *Journal of Behavioral Addictions*, *11*(2), 210-215. doi: 10.1556/2006.2022.00029.

Castro-Calvo, J., King, D. L., Stein, D. J., Brand, M., Carmi, L., Chamberlain, S. R., Demetrovics, Z., Fineberg, N. A., Rumpf, H.-J., Yücel, M., Achab, S., Ambekar, A., Bahar, N., Blaszczynski, A., Bowden-Jones, H., Carbonell, X., Chan, E. M. L., Ko, C.-H., de Timary, P., Dufour, M., Grall-Bronnec, M., Lee, H. K., Higuchi, S., Jimenez-Murcia, S., Király, O., Kuss, D. J., Long, J., Müller, A., Pallanti, S., Potenza, M. N., Rahimi-Movaghar, A., Saunders, J. B., Schimmenti, A., Lee, S.-Y., Siste, K., Spritzer, D. T., Starcevic, V., Weinstein, A. M., Wölfling, K., & Billieux, J. (2021). Expert appraisal of criteria for assessing gaming disorder: An international Delphi study. *Addiction*, *116*(9), 2463-2475. doi: 10.1111/add.15411.

Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior*, *23*(3), 1531-1548. doi: 10.1016/j.chb.2005.07.002.

Conrad, P. (2007). *The medicalization of society*. Baltimore: Johns Hopkins University Press.

Deleuze, J., Nuyens, F., Rochat, L., Rothen, S., Maurage, P., & Billieux, J. (2017). Established risk factors for addiction fail to discriminate between healthy gamers and gamers endorsing DSM-5 Internet gaming disorder. *Journal of Behavioral Addictions*, *6*(4), 516-524. doi: 10.1556/2006.6.2017.074.

Earp, B. D., Wudarczyk, O. A., Foddy, B., & Savulescu, J. (2017). Addicted to love: What is love addiction and when should it be treated? *Philosophy, Psychiatry & Psychology*, *24*(1), 77-92. doi: 10.1353/ppp.2017.0011.

Eigen, J. P. (1991). Delusion in the courtroom: The role of partial insanity in early forensic testimony. *Medical History*, *35*(1), 25-49. doi: 10.1017/s0025727300053114.

Flayelle, M., Schimmenti, A., Starcevic, V., & Billieux, J. (2022). The pitfalls of recycling substance use disorder criteria to diagnose behavioral addictions. In: N. Heather, M. Field, A. C. Moss, & S. Sattel (Eds.), *Evaluating the brain disease model of addiction* (pp. 339-349). London: Routledge. doi: 10.4324/9781003032762-34.

Fournier, L., Schimmenti, A., Musetti, A., Boursier, V., Flayelle, M., Cataldo, I., Starcevic, V., & Billieux, J. (2023). Deconstructing the components model of addiction: An illustration through "addictive" use of social media. *Addictive Behaviors*, *143*, 107694. https://doi.org/10.1016/j.addbeh.2023.107694.

Grall-Bronnec, M., Bulteau, S., Victorri-Vigneau, C., Bouju, G., Sauvaget, A. (2015). Fortune telling addiction: Unfortunately a serious topic. About a case report. *Journal of Behavioral Addictions*, *4*(1), 27-31. https://doi.org/10.1556/jba.4.2015.1.7.

Griffiths, M. D. (2005). A 'components' model of addiction within a biopsychosocial Framework. *Journal of Substance Use*, *10*(4), 191-197. https://doi.org/10.1080/14659890500114359.

Griffiths, M. D. (2017). Behavioural addiction and substance addiction should be defined by their similarities, not their dissimilarities. *Addiction*, *112*(10), 1718-1720. doi: 10.1111/add.13828.

Griffiths, M. D., van Rooij, A. J., Kardefelt-Winther, D., Starcevic, V., Király, O., Pallesen, S., Müller, K., Dreier, M., Carras, M., Prause, N., King, D. L., Aboujaoude, E., Kuss, D. J., Pontes, H. M., Fernandez, O. L., Nagygyorgy, K., Achab, S., Billieux, J., Quandt, T., Carbonell, X., Ferguson, C. J., Hoff, R. A., Derevensky, J., Haagsma, M. C., Delfabbro, P., Coulson, M., Hussain, Z., & Demetrovics, Z. (2016). Working towards an international consensus on criteria for assessing Internet Gaming Disorder: A critical commentary on Petry et al. (2014). *Addiction*, *111*(1), 167-175. doi: 10.1111/add.13057.

Gullo, M. J., Wood, A. P., & Saunders, J. B. (2022). Criteria for the establishment of a new behavioral addiction. Commentary to the debate: "Behavioral addictions in the ICD-11." *Journal of Behavioral Addictions*, *11*(2), 191-198. doi: 10.1556/2006.2022.00031.

Habelt, L., Kemmler, G., Defrancesco, M., Spanier, B., Henningsen, P., Halle, M., Sperner-Unterweger, B., & Hüfner, K. (2023). Why do we climb mountains? An exploration of features of behavioural addiction in mountaineering and the association with stress-related psychiatric disorders. *European Archives of*

Psychiatry and Clinical Neuroscience, *273*(3), 639-647. doi: 10.1007/s00406-022-01476-8.

Higuchi, S., Nakayama, H., Matsuzaki, T., Mihara, S., & Kitayuguchi, T. (2021). Application of the eleventh revision of the International Classification of Diseases gaming disorder criteria to treatment-seeking patients: Comparison with the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders Internet gaming disorder criteria. *Journal of Behavioral Addictions*, *10*(1), 149-158. doi: 10.1556/2006.2020.00099.

Hofmann, B. (2022). Too much, too mild, too early: Diagnosing the excessive expansion of diagnoses. *International Journal of General Medicine*, *15*, 6441-6450. doi: 10.2147/IJGM.S368541.

Horwitz, A. V., & Wakefield, J. C. (2007). *The loss of sadness: How psychiatry transformed normal sorrow into depressive disorder*. New York: Oxford University Press.

Horwitz, A. V., & Wakefield, J. C. (2012). *All we have to fear: Psychiatry's transformation of natural anxieties into mental disorders*. New York: Oxford University Press.

Jo, Y. S., Bhang, S. Y., Choi, J. S., Lee, H. K., Lee, S. Y., & Kweon, Y.-S. (2019). Clinical characteristics of diagnosis for Internet gaming disorder: Comparison of DSM-5 IGD and ICD-11 GD diagnosis. *Journal of Clinical Medicine 8*(7), 945. doi: 10.3390/jcm8070945.

Joyal, C. C., & Carpentier, J. (2017). The prevalence of paraphilic interests and behaviors in the general population: A provincial survey. *Journal of Sex Research*, *54*(2), 161-171. doi: 10.1080/00224499.2016.1139034.

Kardefelt-Winther, D., Heeren, A., Schimmenti, A., van Rooij, A., Maurage, P., Carras, M., Edman, J., Blaszczynski, A., Khazaal, Y., & Billieux, J. (2017). How can we conceptualize behavioural addiction without pathologizing common behaviours? *Addiction*, *112*(10), 1709-1715. doi: 10.1111/add.13763.

King, D. L., Billieux, J., Carragher, N. & Delfabbro, P. H. (2020). Face validity evaluation of screening tools for gaming disorder: Scope, language, and overpathologizing issues. *Journal of Behavioral Addictions*, *9*(1), 1-13. doi: 10.1556/2006.2020.00001.

Király, O., Tóth, D., Urbán, R., Demetrovics, Z., & Maraz, A. (2017). Intense video gaming is not essentially problematic. *Psychology of Addictive Behaviors*, *31*(7), 807-817. doi: 10.1037/adb0000316.

Ko, C.-H., Lin, H.-C., Lin, P.-C., & Yen, J.-Y. (2020). Validity, functional impairment and complications related to Internet gaming disorder in the DSM-5 and gaming disorder in the ICD-11. *Australian and New Zealand Journal of Psychiatry*, *54*(7), 707-718. doi: 10.1177/0004867419881499.

Koob, G. F., & Le Moal, M. (2001). Drug addiction, dysregulation of rewards, and allostasis. *Neuropsychopharmacology*, *24*(2), 97-129. doi: 10.1016/S0893-133X(00)00195-0.

Maraz, A., Urbán, R., Griffiths, M. D., & Demetrovics, Z. (2015). An empirical investigation of dance addiction. *PLoS ONE*, *10*(5), e0125988. doi: 10.1371/journal.pone.0125988.

Moreno-Agostino, D., Wu, Y.-T., Daskalopoulou, C., Hasan, M. T., Huisman, M., & Prina, M. (2021). Global trends in the prevalence and incidence of depression: A systematic review and meta-analysis. *Journal of Affective Disorders*, *281*, 235-243. doi: 10.1016/j.jad.2020.12.035.

Nogueira-López, A., Rial-Boubeta, A., Guadix-García, I., Villanueva-Blasco, V., & Billieux, J. (2023). Prevalence of problematic internet use and problematic gaming in Spanish adolescents. *Psychiatry Research, 326*, 115317. doi: 10.1016/j.psychres.2023.115317.

Schimmenti, A. (2023). Beyond addiction: Rethinking problematic Internet use from a motivational framework. *Clinical Neuropsychiatry*, *20*(6), 471-478. doi: 10.36131/cnfioritieditore20230601.

Starcevic, V. (2016). Behavioural addictions: A challenge for psychopathology and psychiatric nosology. *Australian and New Zealand Journal of Psychiatry*, *50*(8), 721-725. doi: 10.1177/0004867416654009.

Starcevic, V. (2018). Modifying the work-in-progress definition of behavioural addiction. *Journal of Behavioral Addictions*, *7*(Supplement 1), 31.

Starcevic, V., Choi, T. Y., Kim, T. H., Yoo, S.-K., Bae, S., Choi, B.-S., & Han, D. H. (2020). Internet gaming disorder and gaming disorder in the context of seeking and not seeking treatment for video-gaming. *Journal of Psychiatric Research*, *129*, 31-39. doi: 10.1016/j.jpsychires.2020.06.007.

Stein, D. J., Seedat, S., Iversen, A., & Wessely, S. (2007). Post-traumatic stress disorder: Medicine and politics. *Lancet*, *369*(9556),139-144. doi: 10.1016/S0140-6736(07)60075-0.

Stoilova, M., Livingstone, S., & Kardefelt-Winther, D. (2016). Global Kids Online: Researching children's rights globally in the digital age. *Global Studies of Childhood*, *6*(4), 455-466. https://doi.org/10.1177/2043610616676035.

Tuncturk, M., Karacetin, G., Ermis, C., Ciray, R. O., Can, M., Yesilkaya, C., Atay, A., Alkas, G. E., Kasap, D., Guney, O., Alarslan, S., Cakir, B., Halac, E., Tonyali, A., Elmas, F. N., & Turan, S. (2023). Rate of overlap between ICD-11 gaming disorder and DSM-5 Internet gaming disorder along with Turkish reliability of the Gaming Disorder Scale for Adolescents (GADIS-A). *Dubai Medical Journal*, *6*(4), 291-300. https://doi.org/10.1159/000530318.

van Rooij, A. J., Ferguson, C. J., Colder Carras, M., Kardefelt-Winther, D., Shi, J., Aarseth, E., Bean, A. M., Helmersson Bergmark, K., Brus, A., Coulson, M., Deleuze, J., Dullur, P., Dunkels, E., Edman, J., Elson, M., Etchells, P. J., Fiskaali, A., Granic, I., Jansz, J., Karlsen, F., Kaye, L. K., Kirsh, B., Lieberoth, A., Markey, P., Mills, K. L., Nielsen, R. K. L., Orben, A., Poulsen, A., Prause, N., Prax, P., Quandt, T., Schimmenti, A., Starcevic, V., Stutman, G., Turner, N. E., van Looy, J., & Przybylski, A. K. (2018). A weak scientific basis for gaming disorder: Let us err on the side of caution. *Journal of Behavioral Addictions*, *7*(1), 1-9. doi: 10.1556/2006.7.2018.19.

Volkow, N. D., Michaelides, M., & Baler, R. (2019). The neuroscience of drug reward and addiction. *Physiological Reviews*, *99*(4), 2115-2140. doi: 10.1152/physrev.00014.2018.

Wada, K. (2022). Medicalization of grief: Its developments and paradoxes. In J. N. Lester & M. O'Reilly (Eds.), *The Palgrave encyclopedia of critical perspectives on mental health* (pp. 1-14). Cham, Switzerland: Palgrave Macmillan. https://doi.org/10.1007/978-3-030-12852-4_36-1.

World Health Organization. (2018). *The 11th Revision of the International Classification of Diseases*. Geneva: World Health Organization.

World Health Organization. (2024). *Clinical descriptions and diagnostic requirements for ICD-11 mental, behavioural and neurodevelopmental disorders*. Geneva: World Health Organization.

2

DECONSTRUCTING ADDICTION: FROM A CRITERIA-BASED TO AN ETIOLOGY-INFORMED CONCEPTUALIZATION OF EXCESSIVE AND COMPULSIVE BEHAVIORS

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ABSTRACT:

Recent research has emphasized the similarities between Substance Use Disorders and potential behavioral addictions, as well as among the latter. However, critical issues related to validity, etiology, and methodology have been largely overlooked. In the present chapter, we take into consideration some of these issues, with special attention to (a) the implications of defining behavioral addiction as akin or different from substance addiction, and the negative consequences of routinely conceptualizing virtually any poorly controlled activity as addictive; (b) the shortcomings of the evidence used to support component transference between problematic behavior patterns in different domains; (c) the vagueness and lack of formalization of contemporary verbal behavioral addiction theories; and (d) the available evidence on differential etiological pathways for such problematic behavior patterns. On this basis, we suggest a research agenda focused on elaborating formal models of addiction that can inform efforts in prevention, treatment, and public policy interventions by identifying differential causal mechanisms of addictive and addiction-like behavior patterns. Beyond purely semantic controversies, these mechanisms should emerge from theory, be backed by thorough and transparent hypothesis testing, and pinpoint the targets of active ingredients of intervention techniques.

KEYWORDS:

behavioral addiction, definition of addiction, formal theory, validity

1. BACKGROUND: THE RISE OF BEHAVIORAL ADDICTIONS

In 1995, Doctor Ivan Goldberg coined the term 'Internet Addiction' in a satirical online post (now disappeared) intending to criticize the unfounded use of psychiatric terminology to refer to all kinds of daily life struggles, as well as the logic underlying the DSM symptom-based diagnosis system (Wallis, 1997). At the time, the most recent version of the DSM did not recognize the potential for non-drug-related activities to be addictive. All addictive disorders were grouped under Substance Use Disorders (SUD) within the category of Substance-Related Disorders. Pathological Gambling was classified under Impulse-Control Disorders Not Elsewhere Classified (see Chapter 1 in this Handbook).

The situation radically changed with the inclusion of Gambling Disorder in the DSM-5 class *Substance-Related and Addictive Disorders* (Petry et al., 2013), which implied accepting that activities not involving substance use could be considered addictive. Although Internet Gaming Disorder (IGD) was considered for that category, the proposal did not receive sufficient agreement, and IGD was relegated to the *Conditions for Further Study* chapter in Section III (see Petry et al., 2015). IGD, renamed as Gaming Disorder, has nevertheless been included as a second recognized addictive disorder in the last version of the International Classification of Diseases (ICD-11; World Health Organization, 2019), with some differences in the way it is conceptualized and diagnosed, and not without contestation (for an overview, see Aarseth et al., 2017).

Although this chain of events reveals a conservative approach to the inclusion of new behavioral addictions (henceforth, BAs) in the main nosologies, pressure from sectors of the public, stakeholders, and the academic community, along with a general trend to conceptualize psychological distress as mental illness, have caused a dramatic increase in the presence of alleged BAs in the media and the scientific literature. The list of candidate addictive behaviors has steadily grown and now includes most Internet-based activities (e.g., social networking, online pornography consumption, binge-watching TV series, taking selfies, or text messaging; de Alarcón et al., 2019; Kuss & Griffiths,

2011; Nagalingam et al., 2019; Starosta & Izydorczyk, 2020; Sultan, 2014), along with offline activities such as eating (Hebebrand et al., 2014), exercising (Berczik et al., 2012), working (Andreassen et al., 2012), dancing (Maraz, Urbán, et al., 2015), tanning (Nolan et al., 2009), or being in love (Earp et al., 2017).

This state of affairs poses multiple problems. First, validity issues are often insufficiently considered when developing assessment or diagnostic tools for new candidate BAs, a process in which dubious scientific practices are mindlessly reproduced across behavioral domains. Second, the cautions taken before the inclusion of Gambling Disorder in the DSM-5 and Gaming Disorder in the ICD-11 —aimed at avoiding the concept of addiction becoming meaningless— have been neglected in the transference of diagnostic criteria from SUDs to putative BAs, and in the elaboration of assessment tools for them. Third, the psychobiological evidence presented to support the commonalities between substance and non-substance addictions is often weak and contradictory, and faces important inferential problems. Fourth, the establishment of new addictions is, more often than not, blind to the etiological processes leading to the loss of control over the problematic activity. And fifth, BA research lags behind other areas in the adoption of open science practices.

Under the current conditions, a large part of the research produced in the area remains incapable of generating true advances in the understanding, prevention, and treatment of the conditions under study (for a general overview of these issues, see Petry et al., 2018; Starcevic & Aboujaoude, 2017). Throughout the remainder of this chapter, we will critically review some key issues regarding (a) the definition of BA, (b) the adequacy or inadequacy of conceptualizing and diagnosing BAs based on a confirmatory approach to their superficial similarities with SUDs, and (c) some evidence revealing etiological differences between well established and candidate addictive disorders. As a conclusion, (d) we suggest a plan to advance in the understanding of these conditions that can inform better prevention and intervention policies.

2. DEFINING BEHAVIORAL ADDICTION

2.1 The extensional approach

Addiction definitions fall within two broad categories (Sussman, 2017). *Extensional* definitions rely on a list of observable behavioral components or criteria, so that part or all of them need to be present for a behavioral pattern to be considered addictive. The best-known addiction conceptualization of this type is the Components Model (Griffiths, 2005, adapted from Brown, 1993), according to which all addictions are characterized by the presence of salience, tolerance, mood modification, relapse, withdrawal, and conflict. Importantly, according to this model, a behavior should not be classed as an addiction unless there is endorsement and empirical and/or clinical verification of *all* of these components (Griffiths, 2019).

Despite this *sine qua non* condition, DSM-5 criteria and psychometric scales developed to assess BAs based on the endorsement of symptoms establish a cutoff score that can be surpassed in cases in which the individual shows only part of them. For instance, endorsing any four of the nine DSM-5 criteria is sufficient for a positive Gambling Disorder diagnosis, and the initial proposal for a list of IGD criteria established the threshold at five (out of nine) symptoms. In standard self-report questionnaires, each item is rated on a scale, item scores are totaled, and a cutoff score is set to best discriminate between positive and negative cases. So, again, the diagnostic threshold can be reached in the absence of endorsement of one or more symptoms. Hence, customary diagnostic and measurement tools assume that components are additive and interchangeable, that is, all components are equally valid manifestations of a common construct. However, not enough attention has been paid to validity issues, and this assumption probably does not hold for a majority of the potential addictions described in the literature.

The inclusion of Gaming Disorder in the ICD-11 tackled part of the problem by (a) simplifying the criteria for diagnosis (so that Gaming Disorder is defined as "a dysfunctional pattern of gaming characterized by impaired control, an increased priority given to gaming over other interests and daily activities, excessive gaming despite its negative consequences, and functional impairment"), dropping some of the criteria that proved to be more problematic in the DSM-5 proposal; and (b) establishing functional impairment as strictly necessary for a positive diagnosis. This shift is important yet not always sufficiently recognized, and was put in place to avoid conflating intensive engagement with addiction (Billieux et al., 2017).

However, despite being more conservative, this approach comes with its own challenges. The first of these is that the definition of functional impairment can be elusive (Przybylski et al., 2017; Yen et al., 2022). Functional impairment occurs in degrees, rather than in a dichotomous fashion; its degree and presence can depend on whether the assessment is made from an individual or a societal perspective; the individual's perception of dysfunction may not correspond to the health professional's one; and social and cultural values play a role in what is considered dysfunctional (Faucher & Forest, 2021).

The second challenge is that this definition remains blind to the processes underlying the transition between healthy and pathological behavior. Namely, the logic underlying the ICD characterization of Gaming Disorder (which could be extended to other activities) can be useful in preventing non-pathological behavior from been labeled as pathological, but is incapable of establishing the addictive nature of the excessive behavioral pattern. Loss of control, increased priority, and negative consequences are features of many different behaviors (e.g., active avoidance in compulsions; Hauser et al., 2016) that are not best categorized as addictive. The presence of functional impairment can thus help us determine if a behavioral pattern is problematic enough to deserve clinical attention, but not whether it is best classified as addictive or rather falls within another spectrum (or even if a specific diagnostic label is necessary).

The third challenge faced by the ICD-based Gaming Disorder diagnosis is that it explicitly states that, for a positive diagnosis, the behavior pattern must be severe enough to result in significant impairment to a person's functioning. That is, functional impairment must be *caused* by gaming. However, establishing the direction of causality is not always feasible, as it requires a careful analysis of the individual's history that is definitely beyond the possibilities of current psychometric tools and prevalence surveys.

2.2 The intensional approach

The alternative to extensional definitions of addiction are *intensional* ones, based on core constructs with an etiological role in addictive processes. A classic example of these models is the tolerance-withdrawal model (Nathan et al., 2016), according to which drug use is initially motivated by its reinforcing effects, but, eventually, by the need to avoid the symptoms of the withdrawal syndrome (i.e., negative reinforcement). This model underlay the distinction —now abandoned— between Substance Abuse and Substance Dependence in the DSM-IV-TR.

Other models within this category are the incentive sensitization theory (Berridge & Robinson, 2016), the allostatic model (Koob & Schulkin, 2019), the habit formation/compulsion model (Lüscher et al., 2020), and several choice/behavioral allocation models (Hogarth, 2020; Tucker et al., 2023). All of them are based on domain-general learning, neurocognitive, decision-making, or behavioral economics theories, were developed from basic research, and describe how abnormal functioning of general processes can lead to addictive behavior.

Describing these models in detail is beyond the aims of this chapter. However, it is important to stress the role they have played in our understanding of SUDs, as well as their contribution to better treatment and prevention (e.g., Bach & Kiefer, 2023; Verdejo-Garcia & Chong, 2021; Wiers & Verschure, 2021). In the field of BAs, however, the adoption of an *intensional* approach is still in its infancy (Clark & Zack, 2023; Ferrari et al., 2022; Rømer Thomsen et al., 2014), as the field's expansion has heavily relied on multiplying the number of candidate addictions and developing multiple scales to assess their manifestations. This expansion has been accompanied by a proliferation of association maps between poorly defined constructs, and pseudo-explanatory statistical models that mostly ignore the subtleties of causal induction (Bullock et al., 1994; Tomarken & Waller, 2005).

Although valuable, recent attempts to integrate etiological mechanisms into an overarching theoretical account of BAs (Brand, Wegmann, et al., 2019; Perales et al., 2020) are still general frameworks describing the processual pathways that can lead to loss of control over behavior, but are too vague to formulate specific hypotheses regarding their differential weight in substance and non-substance addictions, or in different candidate BAs. They set, however, a path to follow. Eventually, the identification of a limited set of these mechanisms that cut across different addictive processes could help establish a restricted definition of addiction, as opposed to a more general

one in which virtually all instances of diminished control over any activity fitting into an overinclusive extensional definition are thoughtless and automatically classified as addictions. As discussed elsewhere (Perales et al., 2020), this distinction is not purely semantic. Conceptualizing addiction in a restricted sense is necessary to avoid the conflation of delimitation levels mentioned earlier (i.e., distinguishing between addictive behavior and other disordered but non-addictive behaviors *vs* merely distinguishing between disordered and non-disordered behaviors).

Taking this step can have far-reaching societal consequences, as defining *what addiction is* is a requisite for identifying *which products are addictive* (Flayelle et al., 2023). In most jurisdictions, strict policies are justified based on protecting consumers' health from the addictive potential of certain products (see, for instance, Camerer, 2006). Yet, a less directive approach considering both risks and benefits is typically taken with products or activities that may be harmful but not strictly addictive (e.g., junk food). This does not imply that non-strictly addictive products should remain unregulated, or that their health and safety risks should be neglected, but, still, the distinction is central to some of the current social debates regarding digital technologies; namely, whether availability of gambling products should be restricted as a function of their addictive potential (Delfabbro et al., 2021; Livingstone & Rintoul, 2020), or whether digital products or their in-built components, should be legally considered as akin to gambling products (King & Delfabbro, 2019; Przybylski et al., 2017; Xiao, 2021; UK Gambling Commission, 2017).

3. THE CRISIS OF THE CONFIRMATORY AGENDA

The primary drawback of using BA as a broad term to encompass all instances of diminished control over any activity is the embracing of a confirmatory research agenda. Customarily, in a first stage, a pattern of overinvolvement in some activity is defined as addictive based on the superficial similarities between such a behavioral pattern and addiction components. More often than not, this is done through a newly developed scale that recycles the items from another scale previously developed to assess a better-established addictive disorder. Crucially, this step is taken without ensuring that transferred items portray the same meaning across behavioral domains, or even subtly adapting the items to better suit the new context, which increases the risk of incurring the jingle fallacy (using the same term to refer to qualitatively different concepts).

Subsequently, in a second stage, and once the addictive nature of the target activity has been taken for granted, known behavioral and psychobiological correlates of addictive behavior are explored, and any corroboration of a coincidence is interpreted as additional evidence of the addictive nature of the new candidate (Flayelle et al., 2022). Although the drawbacks of the first step have been more extensively analyzed and criticized (e.g., Calvo et al., 2018; Satchell et al., 2021), this second step is also an important source of confusion in the field. First, the mere correlation of a factor or variable with a behavior

does not necessarily imply that such a factor can be used as a marker of the transition between non-pathological and pathological levels of involvement. And second, these correlations often extend to other psychopathologies with shared vulnerability or complication factors, so they portray little information on lost control over the specific activity.

3.1 Pathology markers are not specific to pathological involvement levels

Variability in some of the neurocognitive mechanisms proposed to be involved in addictive behaviors, such as executive functioning or inhibition, is involved in degrees of self-control across different behaviors, and contributes to a wide range of non-clinical psychological challenges (e.g., failing to do enough exercise or to eat healthily). And, the other way around, their malfunctioning is neither necessary nor sufficient to develop an addictive disorder (Fernández-Serrano et al., 2010; Wright et al., 2014; Zelazo, 2020).

Similarly, neuroadaptations in dopamine reward systems play a crucial role in addictive processes, but they also do in the acquisition of all motivated behaviors, particularly those requiring perseverance or sustained effort (Gershman et al., 2024; Lerner et al., 2021; Salamone & Correa, 2024). According to dominant models, what is specific to addiction is the chronic supraphysiological stimulation of reward-related dopaminergic pathways by the administration of an addictive agent, and the aberrant neuroadaptations such stimulation causes (Pascoli et al., 2015; Wise & Robble, 2020). However, despite the idea that dopamine malfunction plays a key role in BAs is widespread, the evidence for supraphysiological stimulation of dopamine circuits and the abnormal neuroadaptations caused by agents other than drugs is only tentative for Gambling Disorder and Compulsive Eating (Balodis & Potenza, 2020; Schulte et al., 2021; Zack et al., 2020; Zack & Poulos, 2009), and virtually nonexistent in any other putative BA.

In more general terms, the evidence regarding the neurobiological basis of BAs is still predominantly cross-sectional, and often contradictory and difficult to integrate (Peng et al., 2022; Tereshchenko, 2023; Yao et al., 2017). This is, in part, a consequence of the replicability and generalizability problems individual differences' neuroimaging is currently facing (Liu et al., 2023; Marek & Laumann, 2024).

Apart from Gambling Disorder, the most extensively researched conditions using brain imaging techniques are Gaming Disorder and Problematic Internet Use, with findings generally showing statistical variability associated with these conditions in the structure, activation, or connectivity of areas related to cognitive control, reactivity to reward-related cues, and emotion regulation (Brand et al., 2014; Chang & Lee, 2024; León Méndez et al., 2024; Schettler et al., 2022; Solly et al., 2022; Weinstein, 2022). These findings have been generally interpreted as supporting a reactive/proactive dual-process model of BA, according to which addictive behaviors result from increased reactivity to specific rewards or reward-related cues (i.e., craving), and diminished prefrontal regulation, especially in the presence of such rewards and cues (Brand et al., 2014). Although these findings suggest some similarities in the transdiagnostic processes involved in substance and non-substance addiction vulnerability, reward reactivity, attention-grabbing

effects of reward-related cues, interference of reward-induced reactivity with cognitive control (for instance, in temptations or intertemporal decisions; Loewenstein, 1996), and the corresponding neuroadaptations in areas like the striatum, the insula, or the orbitofrontal and ventromedial cortices are not specific to addiction-related rewards, but general to normal reward-driven conditioning (Garre-Frutos et al., 2024; Haber & Knutson, 2010). Thus, these neuroimaging-BA correlations are mostly uninformative about the pathological nature of the observed differences.

In the customary case-control study, individuals diagnosed as addicted are pitched against healthy controls, for whom activity-related rewards and materials are substantially less salient, informative, or valuable. Hence, it is not possible to ascertain whether differences are indicative of pathology, or just associated with the differences that come with a more intensive engagement in a highly valued activity. The comparison condition that would allow determining the role of the target areas or circuits in the disorder would be a group of individuals with similar levels of involvement, and for whom related cues and rewards are similarly significant, but not showing signs of pathology (for a distinction between pathological and high non-pathological involvement, see Billieux et al., 2019; Charlton & Danforth, 2007).

3.2 Addiction markers are not specific to addiction

A second significant weakness of the evidence collected using a confirmatory approach is the lack of specificity of BA correlates, not only relative to non-pathological levels of intense involvement in the activity in question, but also in comparison to other psychopathologies. Differences in executive control and inhibition are related to trait differences in self-control, delay discounting, and emotion regulation (Hinshaw, 2003; Nigg, 2017; Noda et al., 2020), so their importance extends beyond addictions. For instance, both cue-induced and trait-like alterations in some of the same areas have been described in Obsessive-Compulsive Disorder (Klugah-Brown, Jiang, et al., 2021; Klugah-Brown, Zhou, et al., 2021) or Attention Deficit and Hyperactivity Disorder (Grimm et al., 2021; Vollstädt-Klein et al., 2020).

This lack of specificity concerning specific diagnostic labels suggests a distinction between the learning and cognitive processes directly responsible for losing control of a particular problematic activity in certain contexts (e.g., incentive sensitization or formation of compulsive habits), and transdiagnostic factors or traits that could facilitate or accelerate those processes. For instance, Perales et al. (2020) distinguish between *core* and *ancillary* factors affecting the progression of addictive disorders, with the latter including reward deficiency (general hypo-responsiveness to alternative rewards), poor executive function (relative reductions in planning, attentional control, working memory, flexibility, and inhibition capacities), cognitive and emotional impulsivity, and emotion dysregulation. All of these show weak-to-moderate correlations with addiction vulnerability and severity (e.g., Hussain et al., 2021; Kräplin et al., 2022; López-Guerrero et al., 2023), but are rather unspecific in the sense discussed here.

4. SEARCHING FOR THE DIFFERENCES

Cross-domain comparative studies in BA research are sparse, and evidence regarding the differential involvement of specific factors across well-established and candidate addictions arises from comparisons between studies that measure the same construct or factor in different domains. These studies, however, vary in the methodologies and measures used, so any claim regarding potential differences must be made cautiously.

In this section, we will briefly review some of the available evidence regarding differences across domains in craving and withdrawal symptoms, comorbidity patterns, and internalization/externalization symptoms. There are certainly other factors apart from these that could reveal differences across domains, but, to our knowledge, these are the most extensively researched, and they can be used as tools to illustrate how to proceed in future research.

4.1 Craving and withdrawal symptoms

Withdrawal symptoms were crucial to defining dependence in SUDs in early nosologies. However, the absence of withdrawal symptoms in some addictive disorders and the corroboration that relapse can occur after evident withdrawal symptoms have disappeared led to the abandonment or refinement of the tolerance-withdrawal model. In some later models, the etiological place of the withdrawal syndrome was occupied by craving. Although withdrawal and craving are sometimes used interchangeably, craving is characterized as being long-lasting, occurring in cue-triggered acute episodes that compromise behavior control and often lead to relapse. Actually, craving is defined in some of these models as conditioned withdrawal (Koob et al., 1997; Siegel et al., 2000).

Most contemporary models (Koob & Volkow, 2016; Robinson & Berridge, 1993, 2024; Tiffany & Wray, 2012) attribute a key role to craving acquisition in the etiology of SUDs. Despite their differences, they all consider craving a conditioned response, and the main motive driving addictive behaviors and, in many cases, relapse. In turn, the preponderant I-PACE model (see Brand, Wegmann, et al., 2019) attributes a similarly important role to craving in BAs, and research has corroborated the presence of craving-related symptoms (e.g., attentional capture, cue reactivity, and physiological responses) in Gambling Disorder (Brevers et al., 2011; Ciccarelli et al., 2022; García-Castro et al., 2023; Limbrick-Oldfield et al., 2017; Mallorquí-Bagué et al., 2023), problematic internet use (Cheng et al., 2023; L. Liu et al., 2024; Moretta & Buodo, 2018, 2022; Nikolaidou et al., 2019), Compulsive Sexual Behavior Disorder (CSBD; Castro-Calvo, Cervigón-Carrasco, et al., 2021; Marino et al., 2023; Pekal et al., 2018; Wang & Li, 2024), and Gaming Disorder (Brand, Rumpf, et al., 2019; Kim et al., 2018; Wang et al., 2017; Zhou et al., 2022), which has been interpreted as evidence of the addictive nature of these conditions.

However, minimal effort has been dedicated to testing the nature and content of craving experiences across conditions, and items in self-report craving measures are generic and blind to qualitative differences (Muela et al., 2022). For instance, in

SUDs, craving is commonly experienced as a strongly aversive state that motivates drug intake via negative reinforcement (Hogarth, 2020; Koob, 2015). Recent work with intensive video game players, on the contrary, has shown that gaming craving is more related to gratification and reward expectancy than to getting rid of a distressful state (López-Guerrero et al., 2023; Rivero et al., 2023). In gamblers, some studies have found craving to be predominantly aversive (Mallorquí-Bagué et al., 2023), whereas others suggest that the affectively positive or negative content of craving could depend on the preferred gambling modality (Muela et al., 2023). Therefore, although positive and negative reinforcement processes are probably simultaneously involved in craving relief (as either gratification or escape), and thus in the maintenance of addictive behaviors and relapse, the study of their relative weight opens a window to research potential differences across conditions.

Beyond the relative weight of aversive and appetitive motivational ingredients in withdrawal, craving, and craving relief, a more detailed analysis of their content and phenomenology across domains is long overdue. Blaszczynski et al. (2008) explored withdrawal symptoms in Alcohol Use Disorder and Gambling Disorder, and found similar levels of depression, general discomfort, irritability/agitation, restlessness, anxiety, and headaches during abstinence. In a similar comparison regarding craving, De Castro et al. (2007, see also Tavares et al., 2005) reported more intense cravings in individuals addicted to gambling than in those addicted to alcohol. However, in the former, craving was predicted by lack of attentiveness and coursed as an unpleasant dearousing state, whereas alcohol craving coursed as an unpleasant arousing state. Additionally, gambling craving was observed to be more dependent upon environmental contingencies.

Although craving- and withdrawal-like states have been described in virtually all candidate BAs (Hormes, 2017), studies exploring their content and phenomenology in BAs other than Gambling Disorder, or comparing these states across substance and non-substance-related disorders are even rarer. For instance, subjective craving for video games has been observed to be almost completely accounted for by gratification (e.g., experiencing fun) and compensation/coping motives (e.g., feeling less lonely or worried) rather than withdrawal-like symptoms (Antons et al., 2023). Accordingly, King and cols. (Cervigón-Carrasco et al., 2024; Evans et al., 2018; Kaptsis et al., 2016; King et al., 2016) analyzed the temporal course and content of craving symptoms during abstinence from video gaming and instant messaging. Similarly to what has been described with some gambling modalities, abstinence triggered boredom, under-stimulation, and a sense of missing out in some individuals, namely, feelings of missing highly valued rewards, whereas (in contrast to gambling) sadness, anxiety, and irritability were not evident. Also diverging from well-established addictions, these feelings followed a downward trajectory during abstinence, and some spontaneous compensation with other leisure-time activities emerged.

In summary, craving and withdrawal experiences have been observed to be equally intense in Gambling Disorder and Alcohol Use Disorder, both in response to abstinence

and conditioned, craving-triggering cues, despite some non-trivial differences in their content. Craving for video games and other digital technologies may portray some similarities with gambling craving (under-stimulation and boredom), but seems to present a different temporal trajectory and is probably more related to declarative motives and more responsive to substitution by alternative activities. To our knowledge, there are no similar time- and content-sensitive analyses in other putative BAs.

Given the above, the necessity of withdrawal symptoms for diagnosing candidate BAs remains uncertain, which marks another potential difference between them and most SUDs. Recent research suggests that withdrawal is a peripheral rather than a core symptom of CSBD, problematic social network use, and Gaming Disorder (Castro-Calvo et al., 2022; Fournier et al., 2023), and a recent Delphi review has concluded that withdrawal has low diagnostic and clinical utility and low prognostic value in Gaming Disorder (Castro-Calvo, King, et al., 2021). Craving, in contrast, despite not being a diagnostic criterion for any BA, seems important in their etiology. However, craving is currently an umbrella term for a variety of reactions with emotional, cognitive, and motor components, but fails to meet the descriptive fidelity and theoretical integrity criteria (Hormes, op. cit.) to be considered a unitary construct on which to cement the similarities between SUDs and BAs, or between different BAs.

4.2 Behavioral addictions' comorbidity patterns and the externalization-internalization axis

A second exploratory approach to find etiological commonalities and differences between well-established and candidate addictive disorders involves analyzing their comorbidity patterns. For instance, Gambling Disorder and SUDs are highly comorbid (Grant & Chamberlain, 2020; Lorains et al., 2011), whereas comorbidity between Gambling and other putative BAs, and between SUDs and BAs other than Gambling Disorder, have been more seldomly investigated.

In one of the few available overarching studies using comparable measures, prevalence rates for food binging, compulsive shopping, workaholism, CSBD, and compulsive exercising were 8.1%, 6.8%, 6.7%, 6.4%, and 3.6%, in a sample of individuals with gambling disorder, which are lower compared to alcohol problems and nicotine dependence rates reported in other studies, and not always much higher than the ones for the general population (Tang et al., 2020). Moreover, these prevalence rates are likely to be inflated, due to the loose definition of 'addictive' in diagnostic tools (García-Manglano et al., 2022).

Other studies have also found significant correlations between gambling problems and other BAs, with relatively stronger associations observed within a cluster formed by Gambling Disorder, alcohol problems, nicotine dependence, disordered eating, and compulsive buying symptoms (Di Nicola et al., 2015; Ford & Håkansson, 2020). Cannabis dependence, in turn, has been reported to weakly correlate with the number of video gaming-related problems [*Incidence Rate Ratio* (IRR) = 1.08], but not with

gambling problems or other candidate BA symptoms (Perales et al., 2021). In the same study, alcohol problems strongly correlated with gambling problems (IRR = 1.97), but much more mildly with symptoms of compulsive buying, CSBD, compulsive Internet use, compulsive video gaming, or disordered eating (IRRs in the 1.14 – 1.33 range); and nicotine dependence was observed to moderately correlate with gambling problems, symptoms of compulsive buying and symptoms of disordered eating (IRRs in the 1.18 – 1.43 range). Beyond corroborating association clusters previously reported, this study is important because it is, to our knowledge, the only one that has used the same system (MultiCAGE CAD-4; Pedrero Pérez et al., 2007) across behavioral domains, and thus allows for comparing association strengths.

Globally considered, comorbidity evidence faces some non-trivial inferential problems. First, the diversity of measures used in different domains (with varying threshold calculation methods and different degrees of reliability) makes prevalence rates for the same condition to wildly vary across studies, which obviously hinders comorbidity comparisons across pairs of conditions. And second, although total samples are sometimes large, the size of the overlap between diagnoses, i.e., people showing comorbidity for two or more relatively rare conditions, is too small to test differential associations (see, for example, Estévez et al., 2021; Ford & Håkansson, 2020; Granero et al., 2016).

A theory-guided alternative to the analysis of raw comorbidity patterns is exploring the position of different candidate BAs in transdiagnostic dimensions, applying a variety of statistical techniques to the analysis of correlations between BAs and symptoms of other psychopathologies, or related theoretically-relevant constructs (Fontenelle et al., 2020; Kim & Hodgins, 2021; Montemarano et al., 2024). Among these dimensions, externalization and internalization are among the ones with a longer research history in psychopathology, so that *externalizing* problems encompass dysfunctional behaviors directed towards the environment, including ADHD, conduct problems, and substance use, whereas *internalizing* problems mostly include anxiety and depression symptoms (Yang et al., 2022).

Despite some legitimate concerns about their definition and measurement (Achenbach et al., 2016), the distinction between internalizing and externalizing symptoms has received empirical support regarding their differential personality, psychobiological and genetic underpinnings (Eaton et al., 2013; Johnson et al., 2017; Krueger et al., 2005). Importantly, SUDs have been consistently conceptualized as externalizing problems, and young people's drug use has been identified as part of a developmental trajectory in which externalizing problems are observed early in life (Patrick et al., 2016). Accordingly, whereas externalizing symptomatology and joint externalizing-internalizing comorbidity are strong longitudinal predictors of drug use in adolescence, internalizing symptomatology by itself is a much weaker one (Colder et al., 2013; King et al., 2004).

In view of this, several studies have used the position of Gambling Disorder in the internalizing-externalizing structure of personality development as a tool to study the degree to which it shares etiological factors with SUDs. For instance, in one study by

King et al. (2020) with 1329 young adult twins, gambling problems were best categorized as externalizing disorders, whereas Richard et al. (2023) followed 744 children for 7 years, and found baseline externalizing symptoms and a less significant decrease in externalizing problems over time to predict gambling engagement in adolescence.

As discussed earlier, given the generality of the externalization construct, and its relationship with a broad spectrum of behavioral problems and psychopathologies, the finding that Substance Use and Gambling Disorders are preponderantly externalizing says relatively little about the potentially common specific mechanisms involved in both conditions. However, the relative position of other candidate BAs on the same dimensions can provide valuable information about the commonality or divergence of developmental trajectories across them, Gambling Disorder, and SUD. For instance, in another study by Richard et al. (2022), baseline measures in childhood of both internalizing and externalizing symptoms predicted disordered gaming symptoms six years later, but only an increasing internalizing problems trend from childhood to adolescence further exacerbated this risk. Accordingly, other studies have confirmed that the internalizing pathway is stronger than the externalizing one in the emergence of gaming problems (Liu et al., 2024).

Altogether, and despite that (a) both internalizing and externalizing symptoms are associated to some degree with both Gaming and Gambling disorder, and (b) there are important individual differences in etiological trajectories to gaming and gambling-related problems, the available evidence favors a preponderantly externalizing pathway for gambling problems and a preponderantly internalizing pathway for gaming problems (Richard et al., 2020). A similar argument has been made regarding Problematic Internet Use (Leo et al., 2021), although, to our knowledge, no systematic exploration of internalizing/externalizing pathways has been conducted for putative BAs other than Gambling and Gaming Disorders.

5. DISCUSSION: OPEN PATHS FOR A NEW AGENDA IN BEHAVIORAL ADDICTION RESEARCH

Systematically exploring the potential differences between well-established and candidate BAs in variables like the ones discussed in the previous section is just a first step in untangling their etiologies. The following steps would require specifying the proposed theoretical models to a degree sufficient to generate quantitative and qualitative hypotheses about the learning, emotional, and cognitive processes involved in the acquisition and chronification of problematic behaviors, and testing them in rigorous and transparent conditions.

The currently available literature already provides some valuable ideas about the nature of these processes, for which more precise formulations are, however, pending. For instance, per the internalizing pathway to Internet-mediated problems, it has been

proposed that Gaming Disorder and Problematic Internet Use can be conceptualized as caused by dysfunctional coping of preexisting distress (Kardefelt-Winther, 2017). Relatedly, Perales et al. (2020) have proposed that the outcomes of some activities (e.g., feeling better, relieving stress, attaining social status or recognition, skill acquisition, or socializing) can become overvalued because they help deal with prior negative affect (coping), or because they constitute goals that cannot be attained by other means (compensation). If valued highly enough, these motives can make that activity displace other activities and cause functional impairment (Ciudad-Fernández et al., 2024). Partially confirming this idea, a preregistered study by Przybylski and Weinstein (2019), showed that a substantial part of the variability in dysregulated gaming was accounted for frustration by the basic psychological needs. However, the mediational role of dysregulated video gaming in the association between needs, frustration and psychological functioning was too small to be clinically relevant, which suggests that dysregulated video gaming is more a part of a general pattern of dysfunctional behavior than a cause of such dysfunction.

Other studies have used the dualistic passion model to distinguish between harmonious (non-pathological) and obsessive (pathological) involvement in video games (Infanti et al., 2023), and have found that obsessive passion is prospectively predicted by low self-esteem and low meaningful life (Sibilla et al., 2021). Similarly, mental health problems seem to longitudinally predict problematic video gaming more strongly than the other way around, reinforcing again the idea that problematic video gaming is more a manifestation than a root cause of mental health problems (Ferguson et al., 2023).

The idea that 'addictive' gaming is, at least in part, a dysfunctional coping or compensatory instrumental behavior has been extended to other domains (Ciudad-Fernández et al., 2024; Gu, 2022; Schivinski et al., 2020; Zhang et al., 2024). However, there are important open questions and challenges. For instance, the exact reasons why the same coping or compensatory behaviors become problematic in some individuals and contexts, but seem to have a protective or therapeutic impact on others (Dienlin & Johannes, 2020; Halbrook et al., 2019; Johannes et al., 2021; Koçak et al., 2024; Orben et al., 2024) remain to be clarified. Additionally, the corroboration that preexisting motives and mental health conditions are vulnerability factors for the problematic use of digital applications can be commercially exploited by designing such applications in a way that takes advantage of such vulnerabilities (Flayelle et al., 2023). Ascertaining how different activities and their ensuing positive and negative outcomes satisfy specific motives in different cases is necessary to make applications safer by design.

Although instrumental motives have a role in all addictive processes (Heyman, 2013), there is also ample recognition that there is something more to addiction than choice. Addictive behaviors are often described as compulsive, and hypothesized to be driven by craving states. As noted earlier, several models have been proposed to account for compulsivity and craving in SUDs, with evidence for such models emerging from the

use of animal research, laboratory experiments, and psychobiological and neuroimaging techniques, but also from clinical settings.

These models are mostly grounded in domain-general learning, neurocognitive, decision-making, or behavioral economics theories. Unfortunately, such is not the case in the study of candidate BAs, maybe excepting Gambling Disorder (Ramnerö et al., 2019; Ross et al., 2012). This problem is aggravated by the lack of agreement regarding the operational and conceptual definitions of key constructs such as compulsivity and craving. Compulsivity is customarily defined as the experience of feeling forced or compelled to act despite awareness of serious negative consequences, and the behavior accompanying that experience. Craving, in turn, refers to an affect-laden state characterized by strong desire and urge. The two concepts are related, as behavior can become compulsive when the need to relieve craving is so strong that it overrides any motives the individual may have to remain abstinent (Clark, 2017; Hales et al., 2023; Hogarth, 2020; Nautiyal et al., 2017; Navas et al., 2019; Potenza, 2014; Ramnerö et al., 2019).

The problems with craving and compulsivity definitions are evident in the psychometric instruments to measure them (Muela et al., 2022). Compulsivity items normally refer to inability to refrain from an activity despite negative consequences, which can comprise from simply falling into daily-life temptations to being involuntarily driven to do something that is completely disconnected from instrumental goals, and insensitive to the most severe punishment. Craving, in turn, ranges from a reward expectancy state to an extreme distress state, strong enough to completely override self-control. In other words, items encompass a very wide range of intensity levels, but also qualitatively different states (e.g., from reward expectancy to aversive withdrawal-like symptoms). Hence, more and better research is needed on two different fronts.

First, qualitative and fine-grained research is necessary to explore craving and compulsivity phenomenology, and to distinguish between the different subjective states that remain confounded in customary psychometric tools. And second, craving and compulsivity must be studied using techniques that allow recording them in the situations in which they occur, so that the common or differential factors that influence their emergence can be registered and/or manipulated.

On the one hand, all kinds of craving are known to be cue-triggered, and several procedures have been designed to elicit craving in the laboratory (e.g., Ashrafioun & Rosenberg, 2012; Cornil et al., 2019; Ledoux et al., 2013; Wegmann et al., 2018). Experimentally induced craving allows studying its subjective and psychophysiological correlates, its impact on other processes (e.g., the interference it is hypothesized to cause on executive control, according to the I-PACE model), and its dependence on moderating factors, either trait-like (e.g., impulsivity) or temporary (e.g., transient emotions). On the other hand, Ecological Momentary Assessment (EMA) has already been used to study the temporal course of craving and perceived loss of control and their real-time associations with other variables (Hawker et al., 2021; Schaefer et al.,

2023; Zhou et al., 2022), and how they react to the implementation of therapeutic tools (e.g., Bahadoor et al., 2021; Merkouris et al., 2020).

However, the study of both experimentally induced and ecologically recorded craving and perceived loss of control must be theoretically guided. For instance, depending on the hypothesized nature of craving in the domain under scrutiny (e.g., primarily appetitive or aversive, resulting from either reward expectancy or incidentally reinstated by Pavlovian associations), craving and loss of control are expected to be more or less related to different emotional and cognitive components of impulsivity, or to automatic or strategic emotion regulation mechanisms. This type of research should allow, not only to better understand the nature of specific candidate BAs, but also to identify the similarities and differences between them and *bona fide* addictive disorders (see López-Guerrero et al., 2023; Muela et al., 2023; Quintero et al., 2020; Rivero et al., 2023). To our knowledge, no direct comparisons between different behavioral domains have been carried out using these or analogous methodologies.

In more general terms, better models that are capable of making better predictions require a higher degree of formalization of the specific causal roles of the constructs included in the model. For instance, if craving acquisition is conceptualized as some type of Pavlovian conditioning of reward-predicting cues (as in the incentive sensitization theory), or the gradual strengthening of an opponent response to the primary effect of an addictive agent (as in the allostatic model), a formal model of this conditioning process applied to a candidate BA should contain parameters that are sensitive to other individual and situational factors (e.g., reward salience, impulsivity, emotion regulation mechanisms, or attention dynamics), so that these factors can be attributed an ancillary role in the functioning of the main mechanism driving the addictive process.

In other words, the field needs a shift from verbal to formal theorization (van Rooij & Blokpoel, 2020; Perales et al., 2024), and the current focus on reporting mostly correlational *findings* does little in favor of a better understanding of truly or supposedly addictive behaviors. Certainly, this problem is not exclusive to the BA field (Fried, 2020), but seems to be especially severe in it. The main reasons for that do not restrict to the field's youth, but have also to do with how it has expanded in the last two decades, mostly disconnecting itself from previous theoretical advances in SUDs, and overgeneralizing non-falsifiable similarities across domains within a confirmatory framework.

Finally, the field could also benefit from the general trend towards a methodological reform in psychology. Although there is no formal assessment of the prevalence of questionable practices (e.g., p-hacking, HARKing, or selective reporting) in BA research, these are known to be quite frequent in psychological research (Banks et al., 2016; Hardwicke et al., 2022), and the factors accounting for the adoption of these practices, such as "publish-or-perish" pressures, or deterioration of the peer-review system (Gopalakrishna et al., 2022), are also present in the BA research arena. Additionally, the field lags behind in adopting Open Science practices (Eben et al., 2023). The theoretical reform advocated

in this chapter would be of little value without a substantial improvement of the current methodological standards.

In summary, BA research is a young field but, as such, should have learnt some lessons from recent history. Psychology and neuroscience are still trying to overcome a theoretical and replication crisis, whose main cause is probably a perverse system of incentives. In the BA field, these incentives fuel the insistence on a purely confirmatory approach with insufficiently formalized theorization about the etiology of the conditions under study, and result in an overproduction of low-relevance correlational findings. Nonetheless, an alternative agenda is feasible, and this should ultimately allow a better understanding of *bona fide* and candidate BAs on which better prevention, treatment, and policy making can be founded.

A large number of activities have the potential to become dysfunctional, but, as a careful assessment of evidence shows, probably in diverse ways. Although the current myriad of candidate diagnoses has positively contributed to increase social awareness and investment of resources in their study, little advancement has been made on specific strategies to deal with them. More precise etiological models are still necessary to determine the ingredients prevention and intervention packages should include to allow these activities to be practiced in healthy ways, and to reinstate healthy engagement patterns in people who have lost their control over them and are experiencing harm.

REFERENCES

Aarseth, E., Bean, A. M., Boonen, H., Carras, M. C., Coulson, M., Das, D., Deleuze, J., Dunkels, E., Edman, J., Ferguson, C. J., Haagsma, M. C., Bergmark, K. H., Hussain, Z., Jansz, J., Kardefelt-Winther, D., Kutner, L., Markey, P., Nielsen, R. K. L., Prause, N., ... Rooij, A. J. V. (2017). *Scholars' open debate paper on the World Health Organization ICD-11 Gaming Disorder proposal*. https://doi.org/10.1556/2006.5.2016.088https://doi.org/10.1556/2006.2022.00085

Achenbach, T. M., Ivanova, M. Y., Rescorla, L. A., Turner, L. V., & Althoff, R. R. (2016). Internalizing/Externalizing Problems: Review and Recommendations for Clinical and Research Applications. *Journal of the American Academy of Child & Adolescent Psychiatry*, *55*(8), 647-656. https://doi.org/10.1016/j.jaac.2016.05.012

Andreassen, C. S., Griffiths, M. D., Hetland, J., & Pallesen, S. (2012). Development of a work addiction scale. *Scandinavian Journal of Psychology*, *53*(3), 265-272. https://doi.org/10.1111/j.1467-9450.2012.00947.x

Antons, S., Liebherr, M., Brand, M., & Brandtner, A. (2023). From game engagement to craving responses – The role of gratification and compensation experiences during video-gaming in casual and at-risk gamers. *Addictive Behaviors Reports*, *18*, 100520. https://doi.org/10.1016/j.abrep.2023.100520

Ashrafioun, L., & Rosenberg, H. (2012). Methods of assessing craving to gamble: A narrative review. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, *26*(3), 536-549. https://doi.org/10.1037/a0026367

Bach, P., & Kiefer, F. (2023). New Approaches to Addiction Treatment Based on Learning and Memory. *Current Topics in Behavioral Neurosciences*. https://doi.org/10.1007/7854_2023_457

Bahadoor, R., Alexandre, J.-M., Fournet, L., Gellé, T., Serre, F., & Auriacombe, M. (2021). Inventory and Analysis of Controlled Trials of Mobile Phone Applications Targeting Substance Use Disorders: A Systematic Review. *Frontiers in Psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.622394

Balodis, I. M., & Potenza, M. N. (2020). Common neurobiological and psychological underpinnings of gambling and substance-use disorders. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *99*, 109847. https://doi.org/10.1016/j.pnpbp.2019.109847

Banks, G. C., Rogelberg, S. G., Woznyj, H. M., Landis, R. S., & Rupp, D. E. (2016). Editorial: Evidence on Questionable Research Practices: The Good, the Bad, and the Ugly. *Journal of Business and Psychology*, *31*(3), 323-338. https://doi.org/10.1007/s10869-016-9456-7

Berczik, K., Szabó, A., Griffiths, M. D., Kurimay, T., Kun, B., Urbán, R., & Demetrovics, Z. (2012). Exercise Addiction: Symptoms, Diagnosis, Epidemiology, and Etiology. *Substance Use & Misuse*, *47*(4), 403-417. https://doi.org/10.3109/10826084.2011.639120

Berridge, K. C., & Robinson, T. E. (2016). Liking, wanting, and the incentive-sensitization theory of addiction. *American Psychologist*, *71*(8), 670-679. https://doi.org/10.1037/amp0000059

Billieux, J., Flayelle, M., Rumpf, H.-J., & Stein, D. J. (2019). High Involvement Versus Pathological Involvement in Video Games: A Crucial Distinction for Ensuring the Validity and Utility of Gaming Disorder. *Current Addiction Reports*, *6*(3), 323-330. https://doi.org/10.1007/s40429-019-00259-x

Billieux, J., King, D. L., Higuchi, S., Achab, S., Bowden-Jones, H., Hao, W., Long, J., Lee, H. K., Potenza, M. N., Saunders, J. B., & Poznyak, V. (2017). *Functional impairment matters in the screening and diagnosis of gaming disorder*. https://doi.org/10.1556/2006.6.2017.036

Blaszczynski, A., Walker, M., Sharpe, L., & Nower, L. (2008). Withdrawal and Tolerance Phenomenon in Problem Gambling. *International Gambling Studies*, *8*(2), 179-192. https://doi.org/10.1080/14459790802140007

Brand, M., Rumpf, H.-J., Demetrovics, Z., King, D. L., Potenza, M. N., & Wegmann, E. (2019).

Gaming Disorder Is a Disorder due to Addictive Behaviors: Evidence from Behavioral and Neuroscientific Studies Addressing Cue Reactivity and Craving, Executive Functions, and Decision-Making. *Current Addiction Reports*, *6*(3), 296-302. https://doi.org/10.1007/s40429-019-00258-y

Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience & Biobehavioral Reviews*, *104*, 1-10. https://doi.org/10.1016/j.neubiorev.2019.06.032

Brand, M., Young, K. S., & Laier, C. (2014). Prefrontal Control and Internet Addiction: A Theoretical Model and Review of Neuropsychological and Neuroimaging Findings. *Frontiers in Human Neuroscience*, *8*. https://doi.org/10.3389/fnhum.2014.00375

Brevers, D., Cleeremans, A., Bechara, A., Laloyaux, C., Kornreich, C., Verbanck, P., & Noël, X. (2011). Time course of attentional bias for gambling information in problem gambling. *Psychology of Addictive Behaviors*, *25*(4), 675-682. https://doi.org/10.1037/a0024201

Brown, R. I. F. (1993). Some contributions of the study of gambling to the study of other addictions. In W. R. Eadington & J. A. Cornelius (Eds.), *Gambling behavior and problem gambling* (pp. 241–272). University of Nevada Press.

Bullock, H. E., Harlow, L. L., & Mulaik, S. A. (1994). Causation issues in structural equation modeling research. *Structural Equation Modeling: A Multidisciplinary Journal*, *1*(3), 253-267. https://doi.org/10.1080/10705519409539977

Calvo, F., Carbonell, X., Oberst, U., & Fuster, H. (2018). *May the passion be with you: The addictive potential of collectible card games, miniatures, and dice of the Star Wars universe*. https://doi.org/10.1556/2006.7.2018.73

Camerer, C. F. (2006). Wanting, Liking, and Learning: Neuroscience and Paternalism. *The University of Chicago Law Review*, *73*(1), 87-110.

Castro-Calvo, J., Cervigón-Carrasco, V., Ballester-Arnal, R., & Giménez-García, C. (2021). Cognitive processes related to problematic pornography use (PPU): A systematic review of experimental studies. *Addictive Behaviors Reports*, *13*, 100345. https://doi.org/10.1016/j.abrep.2021.100345

Castro-Calvo, J., Flayelle, M., Perales, J. C., Brand, M., Potenza, M. N., & Billieux, J. (2022). CSBD Disorder should not be classified by solely relying on component/symptomatic features. Commentary to the debate: "Behavioral addictions in the ICD-11". *Journal of Behavioral Addictions*, *11*(2), 210-215. https://doi.org/10.1556/2006.2022.00029

Castro-Calvo, J., King, D. L., Stein, D. J., Brand, M., Carmi, L., Chamberlain, S. R., Demetrovics, Z., Fineberg, N. A., Rumpf, H.-J., Yücel, M., Achab, S., Ambekar, A., Bahar, N., Blaszczynski, A., Bowden-Jones, H., Carbonell, X., Chan, E. M. L., Ko, C.-H., de Timary, P., … Billieux, J. (2021). Expert appraisal of criteria for assessing gaming disorder: An international Delphi study. *Addiction*, *116*(9), 2463-2475. https://doi.org/10.1111/add.15411

Cervigón-Carrasco, V., Politi, S., Brevers, D., Giménez-García, C., King, D. L., Billieux, J., & Castro-Calvo, J. (2024). Effects of 72-hour abstinence from instant messaging on craving, withdrawal, and affect. *Computers in Human Behavior*, *160*, 108389. https://doi.org/10.1016/j.chb.2024.108389

Chang, M. L. Y., & Lee, I. O. (2024). Functional connectivity changes in the brain of adolescents with internet addiction: A systematic literature review of imaging studies. *PLOS Mental Health*, *1*(1), e0000022. https://doi.org/10.1371/journal.pmen.0000022

Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior*, *23*(3), 1531-1548. https://doi.org/10.1016/j.chb.2005.07.002

Cheng, Y.-C., Huang, Y.-C., & Huang, W.-L. (2023). Can Heart Rate Variability be Viewed as a

Biomarker of Problematic Internet Use? A Systematic Review and Meta-Analysis. *Applied Psychophysiology and Biofeedback*, *48*(1), 1-10. https://doi.org/10.1007/s10484-022-09557-z

Ciccarelli, M., Cosenza, M., Nigro, G., & D'Olimpio, F. (2022). Does craving increase gambling severity? The role of attentional bias. *Journal of Affective Disorders*, *317*, 403-408. https://doi.org/10.1016/j.jad.2022.08.068

Ciudad-Fernández, V., Zarco-Alpuente, A., Escrivá-Martínez, T., Herrero, R., & Baños, R. (2024). How adolescents lose control over social networks: A process-based approach to problematic social network use. *Addictive Behaviors*, *154*, 108003. https://doi.org/10.1016/j.addbeh.2024.108003

Clark, L. (2017). Chapter 27 - Decision-Making in Gambling Disorder: Understanding Behavioral Addictions. En J.-C. Dreher & L. Tremblay (Eds.), *Decision Neuroscience* (pp. 339-347). Academic Press. https://doi.org/10.1016/B978-0-12-805308-9.00027-0

Clark, L., & Zack, M. (2023). Engineered highs: Reward variability and frequency as potential prerequisites of behavioural addiction. *Addictive Behaviors*, *140*, 107626. https://doi.org/10.1016/j.addbeh.2023.107626

Colder, C. R., Scalco, M., Trucco, E. M., Read, J. P., Lengua, L. J., Wieczorek, W. F., & Hawk, L. W. (2013). Prospective Associations of Internalizing and Externalizing Problems and Their Co-Occurrence with Early Adolescent Substance Use. *Journal of Abnormal Child Psychology*, *41*(4), 667-677. https://doi.org/10.1007/s10802-012-9701-0

Cornil, A., Long, J., Rothen, S., Perales, J. C., de Timary, P., & Billieux, J. (2019). The gambling craving experience questionnaire: Psychometric properties of a new scale based on the elaborated intrusion theory of desire. *Addictive Behaviors*, *95*, 110-117. https://doi.org/10.1016/j.addbeh.2019.02.023

de Alarcón, R., de la Iglesia, J. I., Casado, N. M., & Montejo, A. L. (2019). Online Porn Addiction: What We Know and What We Don't—A Systematic Review. *Journal of Clinical Medicine*, *8*(1), Article 1. https://doi.org/10.3390/jcm8010091

de Castro, V., Fong, T., Rosenthal, R. J., & Tavares, H. (2007). A comparison of craving and emotional states between pathological gamblers and alcoholics. *Addictive Behaviors*, *32*(8), 1555-1564. https://doi.org/10.1016/j.addbeh.2006.11.014

Delfabbro, P., Parke, J., Dragecvic, S., Percy, C., & Bayliss, R. (2021). Safer by design: Building a collaborative, integrated and evidence-based framework to inform the regulation and mitigation of gambling product risk. *Journal of Gambling Issues, 48*, 1–30. https://doi.org/10.4309/jgi.2021.48.2

Di Nicola, M., Tedeschi, D., De Risio, L., Pettorruso, M., Martinotti, G., Ruggeri, F., Swierkosz-Lenart, K., Guglielmo, R., Callea, A., Ruggeri, G., Pozzi, G., Di Giannantonio, M., & Janiri, L. (2015). Co-occurrence of alcohol use disorder and behavioral addictions: Relevance of impulsivity and craving. *Drug and Alcohol Dependence*, *148*, 118-125. https://doi.org/10.1016/j.drugalcdep.2014.12.028

Dienlin, T., & Johannes, N. (2020). The impact of digital technology use on adolescent well-being. *Dialogues in Clinical Neuroscience*, *22*(2), 135-142. https://doi.org/10.31887/DCNS.2020.22.2/tdienlin

Earp, B. D., Wudarczyk, O. A., Foddy, B., & Savulescu, J. (2017). Addicted to Love: What Is Love Addiction and When Should It Be Treated? *Philosophy, Psychiatry, & Psychology*, *24*(1), 77-92.

Eaton, N. R., Krueger, R. F., Keyes, K. M., Wall, M., Hasin, D. S., Markon, K. E., Skodol, A. E., & Grant, B. F. (2013). The Structure and Predictive Validity of the Internalizing Disorders. *Journal of abnormal psychology*, *122*(1), 86-92. https://doi.org/10.1037/a0029598

Eben, C., Bőthe, B., Brevers, D., Clark, L., Grubbs, J. B., Heirene, R., ... & Billieux, J. (2023). The landscape of open science in behavioral addiction research: Current practices and future directions. *Journal of Behavioral Addictions, 12*(4), 862-870. https://doi.org/10.1556/2006.2023.00052

Estévez, A., Jáuregui, P., Lopez-Gonzalez, H., Macia, L., Granero, R., Mestre-Bach, G., Fernández-Aranda, F., Gómez-Peña, M., Mor-

agas, L., Mena-Moreno, T., Lozano-Madrid, M., Del Pino-Gutierrez, A., Codina, E., Testa, G., Vintró-Alcaraz, C., Agüera, Z., Munguía, L., Baenas, I., Valenciano-Mendoza, E., … Jiménez-Murcia, S. (2021). Comorbid behavioral and substance-related addictions in young population with and without gambling disorder. *International Gambling Studies*, *21*(1), 133-152. https://doi.org/10.1080/14459795.2020.1836250

Evans, C., King, D. L., & Delfabbro, P. H. (2018). Effect of brief gaming abstinence on withdrawal in adolescent at-risk daily gamers: A randomized controlled study. *Computers in Human Behavior*, *88*, 70-77. https://doi.org/10.1016/j.chb.2018.06.024

Faucher, L., & Forest, D. (2021). *Defining Mental Disorder: Jerome Wakefield and His Critics*. MIT Press.

Ferguson, C. J., Jeong, E. J., & Wang, J. C. K. (2023). Pathological gaming: A longitudinal study from the perspectives of mental health problems and social stress model. *The Journal of General Psychology*, *150*(3), 323-343. https://doi.org/10.1080/00221309.2022.2060176

Fernández-Serrano, M. J., Pérez-García, M., Perales, J. C., & Verdejo-García, A. (2010). Prevalence of executive dysfunction in cocaine, heroin and alcohol users enrolled in therapeutic communities. *European Journal of Pharmacology*, *626*(1), 104-112. https://doi.org/10.1016/j.ejphar.2009.10.019

Ferrari, M. A., Limbrick-Oldfield, E. H., & Clark, L. (2022). Behavioral analysis of habit formation in modern slot machine gambling. *International Gambling Studies*, *22*(2), 317-336. https://doi.org/10.1080/14459795.2022.2088822

Flayelle, M., Brevers, D., King, D. L., Maurage, P., Perales, J. C., & Billieux, J. (2023). A taxonomy of technology design features that promote potentially addictive online behaviours. *Nature Reviews Psychology*, *2*(3), 136-150. https://doi.org/10.1038/s44159-023-00153-4

Flayelle, M., Schimmenti, A., Starcevic, V., & Billieux, J. (2022). The Pitfalls of Recycling Substance-Use Disorder Criteria to Diagnose Behavioral Addictions. En *Evaluating the Brain Disease Model of Addiction*. Routledge.

Fontenelle, L. F., Oldenhof, E., Eduarda Moreira-de-Oliveira, M., Abramowitz, J. S., Antony, M. M., Cath, D., Carter, A., Dougherty, D., Ferrão, Y. A., Figee, M., Harrison, B. J., Hoexter, M., Soo Kwon, J., Küelz, A., Lazaro, L., Lochner, C., Marazziti, D., Mataix-Cols, D., McKay, D., … Yücel, M. (2020). A transdiagnostic perspective of constructs underlying obsessive-compulsive and related disorders: An international Delphi consensus study. *Australian & New Zealand Journal of Psychiatry*, *54*(7), 719-731. https://doi.org/10.1177/0004867420912327

Ford, M., & Håkansson, A. (2020). Problem gambling, associations with comorbid health conditions, substance use, and behavioural addictions: Opportunities for pathways to treatment. *PLOS ONE*, *15*(1), e0227644. https://doi.org/10.1371/journal.pone.0227644

Fournier, L., Schimmenti, A., Musetti, A., Boursier, V., Flayelle, M., Cataldo, I., Starcevic, V., & Billieux, J. (2023). Deconstructing the components model of addiction: An illustration through "addictive" use of social media. *Addictive Behaviors*, *143*, 107694. https://doi.org/10.1016/j.addbeh.2023.107694

Fried, E. I. (2020). Theories and Models: What They Are, What They Are for, and What They Are About. *Psychological Inquiry*, *31*(4), 336-344. https://doi.org/10.1080/1047840X.2020.1854011

García-Castro, J., Cancela, A., & Cárdaba, M. A. M. (2023). Neural cue-reactivity in pathological gambling as evidence for behavioral addiction: A systematic review. *Current Psychology*, *42*(32), 28026-28037. https://doi.org/10.1007/s12144-022-03915-0

García-Manglano, J., López-Madrigal, C., Sádaba-Chalezquer, C., Serrano, C., & Lopez-Fernandez, O. (2022). Difficulties in Establishing "Truth" Conditions in the Assessment of Addictive Smartphone Use in Young Adults. *International Journal of Environmental Research and Public Health*, *19*(1), Article 1. https://doi.org/10.3390/ijerph19010358

Garre-Frutos, F., Vadillo, M. A., González, F., & Lupiáñez, J. (2024). On the reliability of value-modulated attentional capture: An online

replication and multiverse analysis. *Behavior Research Methods*, *56*(6), 5986-6003. https://doi.org/10.3758/s13428-023-02329-5

Gershman, S. J., Assad, J. A., Datta, S. R., Linderman, S. W., Sabatini, B. L., Uchida, N., & Wilbrecht, L. (2024). Explaining dopamine through prediction errors and beyond. *Nature Neuroscience*, *27*(9), 1645-1655. https://doi.org/10.1038/s41593-024-01705-4

Gopalakrishna, G., Riet, G. ter, Vink, G., Stoop, I., Wicherts, J. M., & Bouter, L. M. (2022). Prevalence of questionable research practices, research misconduct and their potential explanatory factors: A survey among academic researchers in The Netherlands. *PLOS ONE*, *17*(2), e0263023. https://doi.org/10.1371/journal.pone.0263023

Granero, R., Fernández-Aranda, F., Steward, T., Mestre-Bach, G., Baño, M., del Pino-Gutiérrez, A., Moragas, L., Aymamí, N., Gómez-Peña, M., Mallorquí-Bagué, N., Tárrega, S., Menchón, J. M., & Jiménez-Murcia, S. (2016). Compulsive Buying Behavior: Characteristics of Comorbidity with Gambling Disorder. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.00625

Grant, J. E., & Chamberlain, S. R. (2020). Gambling and substance use: Comorbidity and treatment implications. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *99*, 109852. https://doi.org/10.1016/j.pnpbp.2019.109852

Griffiths, M. D. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10*(4), 191-197. https://doi.org/10.1080/14659890500114359

Griffiths, M. D. (2019). The evolution of the 'components model of addiction' and the need for a confirmatory approach in conceptualizing behavioral addictions. *Dusunen Adam Journal of Psychiatry and Neurological Sciences*, *32*(3), 179. https://doi.org/10.14744/DAJPNS.2019.00027

Grimm, O., van Rooij, D., Hoogman, M., Klein, M., Buitelaar, J., Franke, B., Reif, A., & Plichta, M. M. (2021). Transdiagnostic neuroimaging of reward system phenotypes in ADHD and comorbid disorders. *Neuroscience & Biobehavioral Reviews*, *128*, 165-181. https://doi.org/10.1016/j.neubiorev.2021.06.025

Gu, M. (2022). Understanding the relationship between distress intolerance and problematic Internet use: The mediating role of coping motives and the moderating role of need frustration. *Journal of Adolescence*, *94*(4), 497-512. https://doi.org/10.1002/jad.12032

Haber, S. N., & Knutson, B. (2010). The Reward Circuit: Linking Primate Anatomy and Human Imaging. *Neuropsychopharmacology*, *35*(1), 4-26. https://doi.org/10.1038/npp.2009.129

Halbrook, Y. J., O'Donnell, A. T., & Msetfi, R. M. (2019). When and How Video Games Can Be Good: A Review of the Positive Effects of Video Games on Well-Being. *Perspectives on Psychological Science*, *14*(6), 1096-1104. https://doi.org/10.1177/1745691619863807

Hales, C. A., Clark, L., & Winstanley, C. A. (2023). Computational approaches to modeling gambling behaviour: Opportunities for understanding disordered gambling. *Neuroscience & Biobehavioral Reviews*, *147*, 105083. https://doi.org/10.1016/j.neubiorev.2023.105083

Hardwicke, T. E., Thibault, R. T., Kosie, J. E., Wallach, J. D., Kidwell, M. C., & Ioannidis, J. P. A. (2022). Estimating the Prevalence of Transparency and Reproducibility-Related Research Practices in Psychology (2014–2017). *Perspectives on Psychological Science*, *17*(1), 239-251. https://doi.org/10.1177/1745691620979806

Hauser, T. U., Eldar, E., & Dolan, R. J. (2016). Neural Mechanisms of Harm-Avoidance Learning: A Model for Obsessive-Compulsive Disorder? *JAMA Psychiatry*, *73*(11), 1196-1197. https://doi.org/10.1001/jamapsychiatry.2016.1938

Hawker, C. O., Merkouris, S. S., Youssef, G. J., & Dowling, N. A. (2021). Exploring the associations between gambling cravings, self-efficacy, and gambling episodes: An Ecological Momentary Assessment study. *Addictive Behaviors*, *112*, 106574. https://doi.org/10.1016/j.addbeh.2020.106574

Hebebrand, J., Albayrak, Ö., Adan, R., Antel, J., Dieguez, C., de Jong, J., Leng, G., Menzies, J., Mercer, J. G., Murphy, M., van der Plasse, G., & Dickson, S. L. (2014). "Eating addiction", rather than "food addiction", better captures

addictive-like eating behavior. *Neuroscience & Biobehavioral Reviews*, *47*, 295-306. https://doi.org/10.1016/j.neubiorev.2014.08.016

Heyman, G. M. (2013). Addiction and Choice: Theory and New Data. *Frontiers in Psychiatry*, *4*. https://doi.org/10.3389/fpsyt.2013.00031

Hinshaw, S. P. (2003). Impulsivity, Emotion Regulation, and Developmental Psychopathology: Specificity Versus Generality of Linkages. *Annals of the New York Academy of Sciences*, *1008*(1), 149-159. https://doi.org/10.1196/annals.1301.016

Hogarth, L. (2020). Addiction is driven by excessive goal-directed drug choice under negative affect: Translational critique of habit and compulsion theory. *Neuropsychopharmacology*, *45*(5), Article 5. https://doi.org/10.1038/s41386-020-0600-8

Hormes, J. M. (2017). The Clinical Significance of Craving Across the Addictive Behaviors: A Review. *Current Addiction Reports*, *4*(2), 132-141. https://doi.org/10.1007/s40429-017-0138-y

Hussain, Z., Wegmann, E., & Griffiths, M. D. (2021). The association between problematic social networking site use, dark triad traits, and emotion dysregulation. *BMC Psychology*, *9*(1), 160. https://doi.org/10.1186/s40359-021-00668-6

Infanti, A., Valls-Serrano, C., Perales, J. C., Vögele, C., & Billieux, J. (2023). Gaming passion contributes to the definition and identification of problematic gaming. *Addictive Behaviors*, *147*, 107805. https://doi.org/10.1016/j.addbeh.2023.107805

Johannes, N., Vuorre, M., & Przybylski, A. K. (2021). Video game play is positively correlated with well-being. *Royal Society Open Science*, *8*(2), 202049. https://doi.org/10.1098/rsos.202049

Johnson, S. L., Tharp, J. A., Peckham, A. D., Carver, C. S., & Haase, C. M. (2017). A path model of different forms of impulsivity with externalizing and internalizing psychopathology: Towards greater specificity. *British Journal of Clinical Psychology*, *56*(3), 235-252. https://doi.org/10.1111/bjc.12135

Kaptsis, D., King, D. L., Delfabbro, P. H., & Gradisar, M. (2016). Trajectories of abstinence-induced Internet gaming withdrawal symptoms: A prospective pilot study. *Addictive Behaviors Reports*, *4*, 24-30. https://doi.org/10.1016/j.abrep.2016.06.002

Kardefelt-Winther, D. (2017). Conceptualizing Internet use disorders: Addiction or coping process? *Psychiatry and Clinical Neurosciences*, *71*(7), 459-466. https://doi.org/10.1111/pcn.12413

Kim, H. S., & Hodgins, D. C. (2021). The Transdiagnostic Mechanisms of Behavioral Addictions and Their Treatment. En N. el-Guebaly, G. Carrà, M. Galanter, & A. M. Baldacchino (Eds.), *Textbook of Addiction Treatment: International Perspectives* (pp. 911-927). Springer International Publishing. https://doi.org/10.1007/978-3-030-36391-8_64

Kim, S. N., Kim, M., Lee, T. H., Lee, J.-Y., Park, S., Park, M., Kim, D.-J., Kwon, J. S., & Choi, J.-S. (2018). Increased Attentional Bias Toward Visual Cues in Internet Gaming Disorder and Obsessive-Compulsive Disorder: An Event-Related Potential Study. *Frontiers in Psychiatry*, *9*. https://doi.org/10.3389/fpsyt.2018.00315

King, D. L., & Delfabbro, P. H. (2019). Video Game Monetization (e.g., 'Loot Boxes'): A Blueprint for Practical Social Responsibility Measures. *International Journal of Mental Health and Addiction*, *17*(1), 166-179. https://doi.org/10.1007/s11469-018-0009-3

King, D. L., Kaptsis, D., Delfabbro, P. H., & Gradisar, M. (2016). Craving for internet games? Withdrawal symptoms from an 84-h abstinence from Massively Multiplayer Online gaming. *Computers in Human Behavior*, *62*, 488-494. https://doi.org/10.1016/j.chb.2016.04.020

King, S. M., Iacono, W. G., & McGue, M. (2004). Childhood externalizing and internalizing psychopathology in the prediction of early substance use. *Addiction*, *99*(12), 1548-1559. https://doi.org/10.1111/j.1360-0443.2004.00893.x

King, S. M., Saunders, G. R. B., Elkins, I. J., Winters, K. C., Iacono, W. G., & McGue, M. (2020). Where do gambling problems fit in the structure of psychopathology during emerging adulthood? *International Gambling Studies*,

20(1), 1-13. https://doi.org/10.1080/14459795.2019.1643901

Klugah-Brown, B., Jiang, C., Agoalikum, E., Zhou, X., Zou, L., Yu, Q., Becker, B., & Biswal, B. (2021). Common abnormality of gray matter integrity in substance use disorder and obsessive-compulsive disorder: A comparative voxel-based meta-analysis. *Human Brain Mapping*, *42*(12), 3871-3886. https://doi.org/10.1002/hbm.25471

Klugah-Brown, B., Zhou, X., Pradhan, B. K., Zweerings, J., Mathiak, K., Biswal, B., & Becker, B. (2021). Common neurofunctional dysregulations characterize obsessive–compulsive, substance use, and gaming disorders—An activation likelihood meta-analysis of functional imaging studies. *Addiction Biology*, *26*(4), e12997. https://doi.org/10.1111/adb.12997

Koçak, Ö. E., Gorgievski, M., & Bakker, A. B. (2024). Recovery from work by playing video games. *Applied Psychology*, *73*(3), 1331-1360. https://doi.org/10.1111/apps.12519

Koob, G. F. (2015). The dark side of emotion: The addiction perspective. *European Journal of Pharmacology*, *753*, 73-87. https://doi.org/10.1016/j.ejphar.2014.11.044

Koob, G. F., Caine, S. B., Parsons, L., Markou, A., & Weiss, F. (1997). Opponent Process Model and Psychostimulant Addiction. *Pharmacology Biochemistry and Behavior*, *57*(3), 513-521. https://doi.org/10.1016/S0091-3057(96)00438-8

Koob, G. F., & Schulkin, J. (2019). Addiction and stress: An allostatic view. *Neuroscience & Biobehavioral Reviews*, *106*, 245-262. https://doi.org/10.1016/j.neubiorev.2018.09.008

Koob, G. F., & Volkow, N. D. (2016). Neurobiology of addiction: A neurocircuitry analysis. *The Lancet Psychiatry*, *3*(8), 760-773. https://doi.org/10.1016/S2215-0366(16)00104-8

Kräplin, A., Joshanloo, M., Wolff, M., Krönke, K.-M., Goschke, T., Bühringer, G., & Smolka, M. N. (2022). The relationship between executive functioning and addictive behavior: New insights from a longitudinal community study. *Psychopharmacology*, *239*(11), 3507-3524. https://doi.org/10.1007/s00213-022-06224-3

Krueger, R. F., Markon, K. E., Patrick, C. J., & Iacono, W. G. (2005). Externalizing Psychopathology in Adulthood: A Dimensional-Spectrum Conceptualization and Its Implications for DSM–V. *Journal of abnormal psychology*, *114*(4), 537-550. https://doi.org/10.1037/0021-843X.114.4.537

Kuss, D. J., & Griffiths, M. D. (2011). Online Social Networking and Addiction—A Review of the Psychological Literature. *International Journal of Environmental Research and Public Health*, *8*(9), 3528-3552. https://doi.org/10.3390/ijerph8093528

Ledoux, T., Nguyen, A. S., Bakos-Block, C., & Bordnick, P. (2013). Using virtual reality to study food cravings. *Appetite*, *71*, 396-402. https://doi.org/10.1016/j.appet.2013.09.006

Leo, K., Kewitz, S., Wartberg, L., & Lindenberg, K. (2021). Depression and Social Anxiety Predict Internet Use Disorder Symptoms in Children and Adolescents at 12-Month Follow-Up: Results From a Longitudinal Study. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.787162

León Méndez, M., Padrón, I., Fumero, A., & Marrero, R. J. (2024). Effects of internet and smartphone addiction on cognitive control in adolescents and young adults: A systematic review of fMRI studies. *Neuroscience & Biobehavioral Reviews*, *159*, 105572. https://doi.org/10.1016/j.neubiorev.2024.105572

Lerner, T. N., Holloway, A. L., & Seiler, J. L. (2021). Dopamine, Updated: Reward Prediction Error and Beyond. *Current Opinion in Neurobiology*, *67*, 123-130. https://doi.org/10.1016/j.conb.2020.10.012

Limbrick-Oldfield, E. H., Mick, I., Cocks, R. E., McGonigle, J., Sharman, S. P., Goldstone, A. P., Stokes, P. R. A., Waldman, A., Erritzoe, D., Bowden-Jones, H., Nutt, D., Lingford-Hughes, A., & Clark, L. (2017). Neural substrates of cue reactivity and craving in gambling disorder. *Translational Psychiatry*, *7*(1), e992-e992. https://doi.org/10.1038/tp.2016.256

Liu, L., Yao, Y.-W., Fang, X.-Y., Xu, L.-X., Hu, M.-J., Zhang, J.-T., & Potenza, M. N. (2024). *Compulsivity-related behavioral features of problematic usage of the internet: A scoping review of*

paradigms, progress, and perspectives. https://doi.org/10.1556/2006.2024.00023

Liu, S., Abdellaoui, A., Verweij, K. J. H., & van Wingen, G. A. (2023). Replicable brain–phenotype associations require large-scale neuroimaging data. *Nature Human Behaviour*, *7*(8), 1344-1356. https://doi.org/10.1038/s41562-023-01642-5

Liu, Y., Qiu, Z., & van den Wildenberg, W. P. M. (2024). Alexithymia and internet gaming disorder: The mediating role of internalizing and externalizing problems. *Current Psychology*, *43*(12), 10567-10577. https://doi.org/10.1007/s12144-023-05113-y

Livingstone, C., & Rintoul, A. (2020). Moving on from responsible gambling: A new discourse is needed to prevent and minimise harm from gambling. *Public Health*, *184*, 107-112. https://doi.org/10.1016/j.puhe.2020.03.018

Loewenstein, G. (1996). Out of Control: Visceral Influences on Behavior. *Organizational Behavior and Human Decision Processes*, *65*(3), 272-292. https://doi.org/10.1006/obhd.1996.0028

López-Guerrero, J., Navas, J. F., Perales, J. C., Rivero, F. J., & Muela, I. (2023). The Interrelation Between Emotional Impulsivity, Craving, and Symptoms Severity in Behavioral Addictions and Related Conditions: A Theory-Driven Systematic Review. *Current Addiction Reports*, *10*(4), 718-736. https://doi.org/10.1007/s40429-023-00512-4

Lorains, F. K., Cowlishaw, S., & Thomas, S. A. (2011). Prevalence of comorbid disorders in problem and pathological gambling: Systematic review and meta-analysis of population surveys. *Addiction*, *106*(3), 490-498. https://doi.org/10.1111/j.1360-0443.2010.03300.x

Lüscher, C., Robbins, T. W., & Everitt, B. J. (2020). The transition to compulsion in addiction. *Nature Reviews Neuroscience*, *21*(5), 247-263. https://doi.org/10.1038/s41583-020-0289-z

Mallorquí-Bagué, N., Mestre-Bach, G., & Testa, G. (2023). Craving in gambling disorder: A systematic review. *Journal of Behavioral Addictions*, *12*(1), 53-79. https://doi.org/10.1556/2006.2022.00080

Maraz, A., Urbán, R., Griffiths, M. D., & Demetrovics, Z. (2015). An Empirical Investigation of Dance Addiction. *PLOS ONE*, *10*(5), e0125988. https://doi.org/10.1371/journal.pone.0125988

Marek, S., & Laumann, T. O. (2024). Replicability and generalizability in population psychiatric neuroimaging. *Neuropsychopharmacology*, 1-6. https://doi.org/10.1038/s41386-024-01960-w

Marino, C., Melodia, F., Pivetta, E., Mansueto, G., Palmieri, S., Caselli, G., Canale, N., Vieno, A., Conti, F., & Spada, M. M. (2023). Desire thinking and craving as predictors of problematic Internet pornography use in women and men. *Addictive Behaviors*, *136*, 107469. https://doi.org/10.1016/j.addbeh.2022.107469

Merkouris, S. S., Hawker, C. O., Rodda, S. N., Youssef, G. J., & Dowling, N. A. (2020). GamblingLess: Curb Your Urge: Development and usability testing of a smartphone-delivered ecological momentary intervention for problem gambling. *International Gambling Studies*, *20*(3), 515-538. https://doi.org/10.1080/14459795.2020.1749293

Montemarano, V., Kim, H. S., & Antony, M. M. (2024). A comparison of buying disorder to addictive and obsessive–compulsive disorders on impulsivity, compulsivity, and reward processing: A narrative review. *Current Psychology*, *43*(10), 9336-9354. https://doi.org/10.1007/s12144-023-05040-y

Moretta, T., & Buodo, G. (2018). Autonomic stress reactivity and craving in individuals with problematic Internet use. *PLOS ONE*, *13*(1), e0190951. https://doi.org/10.1371/journal.pone.0190951

Moretta, T., & Buodo, G. (2022). *Cue reactivity in individuals with problematic use of social media: An event-related potential study*. https://doi.org/10.1556/2006.2022.00700

Muela, I., Navas, J. F., Ventura-Lucena, J. M., & Perales, J. C. (2022). How to pin a compulsive behavior down: A systematic review and conceptual synthesis of compulsivity-sensitive items in measures of behavioral addiction. *Addictive Behaviors*, *134*, 107410. https://doi.org/10.1016/j.addbeh.2022.107410

Muela, I., Ventura-Lucena, J. M., Navas, J. F., & Perales, J. C. (2023). The associative learning roots of affect-driven impulsivity and its role in problem gambling: A replication attempt and

extension of Quintero et al. (2020). *Journal of Behavioral Addictions*, *12*(1), 201-218. https://doi.org/10.1556/2006.2023.00009

Nagalingam, S., Arumugam, B., & Preethy, S. P. T. (2019). Selfie addiction: The prodigious self-portraits. *International Journal of Research in Medical Sciences*, *7*(3), 694-698. https://doi.org/10.18203/2320-6012.ijrms20190919

Nathan, P. E., Conrad, M., & Skinstad, A. H. (2016). History of the Concept of Addiction. *Annual Review of Clinical Psychology*, *12*(Volume 12, 2016), 29-51. https://doi.org/10.1146/annurev-clinpsy-021815-093546

Nautiyal, K. M., Okuda, M., Hen, R., & Blanco, C. (2017). Gambling disorder: An integrative review of animal and human studies. *Annals of the New York Academy of Sciences*, *1394*(1), 106-127. https://doi.org/10.1111/nyas.13356

Navas, J. F., Billieux, J., Verdejo-García, A., & Perales, J. C. (2019). Neurocognitive Components of Gambling Disorder: Implications for assessment, treatment and policy. En *Harm Reduction for Gambling*. Routledge.

Nigg, J. T. (2017). Annual Research Review: On the relations among self-regulation, self-control, executive functioning, effortful control, cognitive control, impulsivity, risk-taking, and inhibition for developmental psychopathology. *Journal of Child Psychology and Psychiatry*, *58*(4), 361-383. https://doi.org/10.1111/jcpp.12675

Nikolaidou, M., Fraser, D. S., & Hinvest, N. (2019). *Attentional bias in Internet users with problematic use of social networking sites*. https://doi.org/10.1556/2006.8.2019.60

Noda, Y., Barr, M. S., ElSalhy, M., Masuda, F., Tarumi, R., Ogyu, K., Wada, M., Tsugawa, S., Miyazaki, T., Nakajima, S., & Mimura, M. (2020). Neural correlates of delay discount alterations in addiction and psychiatric disorders: A systematic review of magnetic resonance imaging studies. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *99*, 109822. https://doi.org/10.1016/j.pnpbp.2019.109822

Nolan, B. V., Taylor, S. L., Liguori, A., & Feldman, S. R. (2009). Tanning as an addictive behavior: A literature review. *Photodermatology, Photoimmunology & Photomedicine*, *25*(1), 12-19. https://doi.org/10.1111/j.1600-0781.2009.00392.x

Orben, A., Meier, A., Dalgleish, T., & Blakemore, S.-J. (2024). Mechanisms linking social media use to adolescent mental health vulnerability. *Nature Reviews Psychology*, *3*(6), 407-423. https://doi.org/10.1038/s44159-024-00307-y

Pascoli, V., Terrier, J., Hiver, A., & Lüscher, C. (2015). Sufficiency of Mesolimbic Dopamine Neuron Stimulation for the Progression to Addiction. *Neuron*, *88*(5), 1054-1066. https://doi.org/10.1016/j.neuron.2015.10.017

Patrick, C. J., Foell, J., Venables, N. C., & Worthy, D. A. (2016). Substance use disorders as externalizing outcomes. En *The Oxford handbook of externalizing spectrum disorders* (pp. 38-60). Oxford University Press.

Pedrero Pérez, E. J., Rodríguez Monje, M. T., Gallardo Alonso, F., Fernández Girón, M., Pérez López, M., & Chicharro Romero, J. (2007). Validación de un instrumento para la detección de trastornos de control de impulsos y adicciones: El MULTICAGE CAD-4. *Trastornos Adictivos*, *9*(4), 269-278. https://doi.org/10.1016/S1575-0973(07)75656-8

Pekal, J., Laier, C., Snagowski, J., Stark, R., & Brand, M. (2018). *Tendencies toward Internet-pornography-use disorder: Differences in men and women regarding attentional biases to pornographic stimuli*. https://doi.org/10.1556/2006.7.2018.70

Peng, W., Hao, Q., Gao, H., Wang, Y., Wang, J., Tu, Y., Yu, S., Li, H., & Zhu, T. (2022). Functional Neural Alterations in Pathological Internet Use: A Meta-Analysis of Neuroimaging Studies. *Frontiers in Neurology*, *13*. https://doi.org/10.3389/fneur.2022.841514

Perales, J. C., Flayelle, M., Verdejo-García, A., Clark, L., & Billieux, J. (2024). Cognitive, computational and learning processes involved in behavioral addiction: Current views and future directions. *Addictive Behaviors*, *148*, 107874. https://doi.org/10.1016/j.addbeh.2023.107874

Perales, J. C., King, D. L., Navas, J. F., Schimmenti, A., Sescousse, G., Starcevic, V., van Holst, R. J., & Billieux, J. (2020). Learning to lose control: A process-based account

of behavioral addiction. *Neuroscience and Biobehavioral Reviews*, *108*, 771-780. https://doi.org/10.1016/j.neubiorev.2019.12.025

Perales, J. C., Maldonado, A., López-Quirantes, E. M., & López-Torrecillas, F. (2021). Association patterns of cannabis abuse and dependence with risk of problematic non-substance-related dysregulated and addictive behaviors. *PLOS ONE*, *16*(8), e0255872. https://doi.org/10.1371/journal.pone.0255872

Petry, N. M., Blanco, C., Stinchfield, R., & Volberg, R. (2013). An empirical evaluation of proposed changes for gambling diagnosis in the DSM-5. *Addiction*, *108*(3), 575-581. https://doi.org/10.1111/j.1360-0443.2012.04087.x

Petry, N. M., Rehbein, F., Ko, C.-H., & O'Brien, C. P. (2015). Internet Gaming Disorder in the DSM-5. *Current Psychiatry Reports*, *17*(9), 72. https://doi.org/10.1007/s11920-015-0610-0

Petry, N. M., Zajac, K., & Ginley, M. K. (2018). Behavioral Addictions as Mental Disorders: To Be or Not To Be? *Annual Review of Clinical Psychology*, *14*(Volume 14, 2018), 399-423. https://doi.org/10.1146/annurev-clinpsy-032816-045120

Potenza, M. N. (2014). The neural bases of cognitive processes in gambling disorder. *Trends in Cognitive Sciences*, *18*(8), 429-438. https://doi.org/10.1016/j.tics.2014.03.007

Przybylski, A. K., & Weinstein, N. (2019). Investigating the Motivational and Psychosocial Dynamics of Dysregulated Gaming: Evidence From a Preregistered Cohort Study. *Clinical Psychological Science*, *7*(6), 1257-1265. https://doi.org/10.1177/2167702619859341

Przybylski, A. K., Weinstein, N., & Murayama, K. (2017). Internet Gaming Disorder: Investigating the Clinical Relevance of a New Phenomenon. *American Journal of Psychiatry*, *174*(3), 230-236. https://doi.org/10.1176/appi.ajp.2016.16020224

Quintero, M. J., Navas, J. F., & Perales, J. C. (2020). The associative underpinnings of negative urgency and its role in problematic gambling behavior. *Addictive Behaviors*, *111*, 106533. https://doi.org/10.1016/j.addbeh.2020.106533

Ramnerö, J., Molander, O., Lindner, P., & Carlbring, P. (2019). What can be learned about gambling from a learning perspective? A narrative review. *Nordic Psychology*, *71*(4), 303-322. https://doi.org/10.1080/19012276.2019.1616320

Richard, J., Fletcher, É., Boutin, S., Derevensky, J., & Temcheff, C. (2020). *Conduct problems and depressive symptoms in association with problem gambling and gaming: A systematic review*. https://doi.org/10.1556/2006.2020.00045

Richard, J., Temcheff, C., Fletcher, É., Lemieux, A., Derevensky, J., & Déry, M. (2022). An empirical investigation of the externalizing and internalizing pathways to disordered gaming behavior: A longitudinal study across childhood and adolescence. *Computers in Human Behavior*, *128*, 107096. https://doi.org/10.1016/j.chb.2021.107096

Richard, J., Temcheff, C., Fletcher, É., Lemieux, A., Derevensky, J., & Déry, M. (2023). Externalizing and internalizing trajectories to adolescent gambling: A longitudinal study. *International Gambling Studies*, *23*(3), 433-451. https://doi.org/10.1080/14459795.2022.2154378

Rivero, F. J., Muela, I., Navas, J. F., Blanco, I., Martín-Pérez, C., Rodas, J. A., Jara-Rizzo, M. F., Brevers, D., & Perales, J. C. (2023). The role of negative and positive urgency in the relationship between craving and symptoms of problematic video game use. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *17*(3), Article 3. https://doi.org/10.5817/CP2023-3-4

Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: An incentive-sensitization theory of addiction. *Brain Research Reviews*, *18*(3), 247-291. https://doi.org/10.1016/0165-0173(93)90013-P

Robinson, T. E., & Berridge, K. C. (2024). *The Incentive-Sensitization Theory of Addiction 30 Years On*. https://doi.org/10.1146/annurev-psych-011624-024031

Rømer Thomsen, K., Fjorback, L. O., Møller, A., & Lou, H. C. (2014). Applying incentive sensitization models to behavioral addiction. *Neuroscience & Biobehavioral Reviews*,

45, 343-349. https://doi.org/10.1016/j.neubiorev.2014.07.009

Ross, D., Sharp, C., Vuchinich, R. E., & Spurrett, D. (2012). *Midbrain mutiny: The picoeconomics and neuroeconomics of disordered gambling: Economic theory and cognitive science*. MIT press.

Salamone, J. D., & Correa, M. (2024). The Neurobiology of Activational Aspects of Motivation: Exertion of Effort, Effort-Based Decision Making, and the Role of Dopamine. *Annual Review of Psychology*, *75*(Volume 75, 2024), 1-32. https://doi.org/10.1146/annurev-psych-020223-012208

Satchell, L. P., Fido, D., Harper, C. A., Shaw, H., Davidson, B., Ellis, D. A., Hart, C. M., Jalil, R., Bartoli, A. J., Kaye, L. K., Lancaster, G. L. J., & Pavetich, M. (2021). Development of an Offline-Friend Addiction Questionnaire (O-FAQ): Are most people really social addicts? *Behavior Research Methods*, *53*(3), 1097-1106. https://doi.org/10.3758/s13428-020-01462-9

Schaefer, L. M., Forester, G., Burr, E. K., Laam, L., Crosby, R. D., Peterson, C. B., Crow, S. J., Engel, S. G., Dvorak, R. D., & Wonderlich, S. A. (2023). Examining the role of craving in affect regulation models of binge eating: Evidence from an ecological momentary assessment study. *Journal of Psychopathology and Clinical Science*, *132*(6), 725-732. https://doi.org/10.1037/abn0000839

Schettler, L., Thomasius, R., & Paschke, K. (2022). Neural correlates of problematic gaming in adolescents: A systematic review of structural and functional magnetic resonance imaging studies. *Addiction Biology*, *27*(1), e13093. https://doi.org/10.1111/adb.13093

Schivinski, B., Brzozowska-Woś, M., Stansbury, E., Satel, J., Montag, C., & Pontes, H. M. (2020). Exploring the Role of Social Media Use Motives, Psychological Well-Being, Self-Esteem, and Affect in Problematic Social Media Use. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.617140

Schulte, E. M., Chao, A. M., & Allison, K. C. (2021). Advances in the Neurobiology of Food Addiction. *Current Behavioral Neuroscience Reports*, *8*(4), 103-112. https://doi.org/10.1007/s40473-021-00234-9

Sibilla, F., Musetti, A., & Mancini, T. (2021). Harmonious and obsessive involvement, self-esteem, and well-being. A longitudinal study on MMORPG players. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *15*(3), Article 3. https://doi.org/10.5817/CP2021-3-1

Siegel, S., Baptista, M. A. S., Kim, J. A., McDonald, R. V., & Weise-Kelly, L. (2000). Pavlovian psychopharmacology: The associative basis of tolerance. *Experimental and Clinical Psychopharmacology*, *8*(3), 276-293. https://doi.org/10.1037/1064-1297.8.3.276

Solly, J. E., Hook, R. W., Grant, J. E., Cortese, S., & Chamberlain, S. R. (2022). Structural gray matter differences in Problematic Usage of the Internet: A systematic review and meta-analysis. *Molecular Psychiatry*, *27*(2), 1000-1009. https://doi.org/10.1038/s41380-021-01315-7

Starcevic, V., & Aboujaoude, E. (2017). Internet addiction: Reappraisal of an increasingly inadequate concept. *CNS Spectrums*, *22*(1), 7-13. https://doi.org/10.1017/S1092852915000863

Starosta, J. A., & Izydorczyk, B. (2020). Understanding the Phenomenon of Binge-Watching—A Systematic Review. *International Journal of Environmental Research and Public Health*, *17*(12), Article 12. https://doi.org/10.3390/ijerph17124469

Sultan, A. J. (2014). Addiction to mobile text messaging applications is nothing to "lol" about. *The Social Science Journal*, *51*(1), 57-69. https://doi.org/10.1016/j.soscij.2013.09.003

Sussman, S. (2017). *Substance and behavioral addictions: Concepts, causes, and cures* (pp. xiv, 404). Cambridge University Press.

Tang, K. T. Y., Kim, H. S., Hodgins, D. C., McGrath, D. S., & Tavares, H. (2020). Gambling disorder and comorbid behavioral addictions: Demographic, clinical, and personality correlates. *Psychiatry Research*, *284*, 112763. https://doi.org/10.1016/j.psychres.2020.112763

Tavares, H., Zilberman, M. L., Hodgins, D. C., & El-Guebaly, N. (2005). Comparison of Craving Between Pathological Gamblers and Alcoholics. *Alcoholism: Clinical and Ex-*

perimental Research, *29*(8), 1427-1431. https://doi.org/10.1097/01.alc.0000175071.22872.98

Tereshchenko, S. Y. (2023). Neurobiological risk factors for problematic social media use as a specific form of Internet addiction: A narrative review. *World Journal of Psychiatry*, *13*(5), 160-173. https://doi.org/10.5498/wjp.v13.i5.160

Tiffany, S. T., & Wray, J. M. (2012). The clinical significance of drug craving. *Annals of the New York Academy of Sciences*, *1248*(1), 1-17. https://doi.org/10.1111/j.1749-6632.2011.06298.x

Tomarken, A. J., & Waller, N. G. (2005). Structural Equation Modeling: Strengths, Limitations, and Misconceptions. *Annual Review of Clinical Psychology*, *1*(Volume 1, 2005), 31-65. https://doi.org/10.1146/annurev.clinpsy.1.102803.144239

Tucker, J. A., Buscemi, J., Murphy, J. G., Reed, D. D., & Vuchinich, R. E. (2023). Addictive Behavior as Molar Behavioral Allocation: Distinguishing Efficient and Final Causes in Translational Research and Practice. *Psychology of addictive behaviors : journal of the Society of Psychologists in Addictive Behaviors*, *37*(1), 1-12. https://doi.org/10.1037/adb0000845

UK Gambling Commission. (2017). *Virtual currencies, eSports, and social casino gambling – Position paper.* http://www.gamblingcommission.gov.uk/PDF/Virtual-currencies-eSports-and-social-casino-gaming.pdf

van Rooij, I., & Blokpoel, M. (2020). Formalizing Verbal Theories. *Social Psychology*, *51*(5), 285-298. https://doi.org/10.1027/1864-9335/a000428

Verdejo-Garcia, A., & Chong, T. T.-J. (2021). Targeting goal-based decision-making for addiction recovery. *Pharmacology, Biochemistry and Behavior*, *210*. https://doi.org/10.1016/j.pbb.2021.173275

Vollstädt-Klein, S., Gerhardt, S., Lee, A., Strosche, A., Sharafi, G., Nuriyeva, R., Seidt, J., Hennig, O., Alm, B., Hermann, D., Sommer, W., Kiefer, F., Luderer, M., & Sobanski, E. (2020). Interaction between behavioral inhibition and neural alcohol cue-reactivity in ADHD and alcohol use disorder. *Psychopharmacology*, *237*(6), 1691-1707. https://doi.org/10.1007/s00213-020-05492-1

Wallis, D. (1997, January 5). *Just Click No. The New Yorker*. https://www.newyorker.com/magazine/1997/01/13/just-click-no

Wang, J., & Li, H. (2024). Neural Correlates of the Attentional Bias Towards Subliminal Pornographic Cues in Individuals with Tendencies Toward Problematic Pornography Use: An ERP Study Using a Dot-Probe Task. *Archives of Sexual Behavior*, *53*(9), 3365-3378. https://doi.org/10.1007/s10508-024-02965-8

Wang, L., Wu, L., Wang, Y., Li, H., Liu, X., Du, X., & Dong, G. (2017). Altered Brain Activities Associated with Craving and Cue Reactivity in People with Internet Gaming Disorder: Evidence from the Comparison with Recreational Internet Game Users. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.01150

Wegmann, E., Stodt, B., & Brand, M. (2018). Cue-induced craving in Internet-communication disorder using visual and auditory cues in a cue-reactivity paradigm. *Addiction Research & Theory*, *26*(4), 306-314. https://doi.org/10.1080/16066359.2017.1367385

Weinstein, A. (2022). Problematic Internet usage: Brain imaging findings. *Current Opinion in Behavioral Sciences*, *47*, 101209. https://doi.org/10.1016/j.cobeha.2022.101209

Wiers, R. W., & Verschure, P. (2021). Curing the broken brain model of addiction: Neurorehabilitation from a systems perspective. *Addictive Behaviors*, *112*, 106602. https://doi.org/10.1016/j.addbeh.2020.106602

Wise, R. A., & Robble, M. A. (2020). Dopamine and Addiction. *Annual Review of Psychology*, *71*(Volume 71, 2020), 79-106. https://doi.org/10.1146/annurev-psych-010418-103337

World Health Organization. (2019). *International Classification of Diseases (11th ed.)*. https://icd.who.int/

Wright, L., Lipszyc, J., Dupuis, A., Thayapararajah, S. W., & Schachar, R. (2014). Response inhibition and psychopathology: A meta-analysis of go/no-go task performance. *Journal of Abnormal Psychology*, *123*(2), 429-439. https://doi.org/10.1037/a0036295

Xiao, L. Y. (2021). *Regulating loot boxes as gambling? Towards a combined legal and self-regu-*

latory consumer protection approach. https://doi.org/10.4337/ielr.2021.01.02

Yang, Y., Shields, G. S., Zhang, Y., Wu, H., Chen, H., & Romer, A. L. (2022). Child executive function and future externalizing and internalizing problems: A meta-analysis of prospective longitudinal studies. *Clinical Psychology Review*, *97*, 102194. https://doi.org/10.1016/j.cpr.2022.102194

Yao, Y.-W., Liu, L., Ma, S.-S., Shi, X.-H., Zhou, N., Zhang, J.-T., & Potenza, M. N. (2017). Functional and structural neural alterations in Internet gaming disorder: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews*, *83*, 313-324. https://doi.org/10.1016/j.neubiorev.2017.10.029

Yen, J.-Y., Higuchi, S., Lin, P.-Y., Lin, P.-C., Chou, W.-P., & Ko, C.-H. (2022). *Functional impairment, insight, and comparison between criteria for gaming disorder in the International Classification of Diseases, 11 Edition and internet gaming disorder in Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*. https://doi.org/10.1556/2006.2022.00079

Zack, M., & Poulos, C. X. (2009). Parallel Roles for Dopamine in Pathological Gambling and Psychostimulant Addiction. *Current Drug Abuse Reviews*, *2*(1), 11-25.

Zack, M., St George, R., & Clark, L. (2020). Dopaminergic signaling of uncertainty and the aetiology of gambling addiction. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *99*, 109853. https://doi.org/10.1016/j.pnpbp.2019.109853

Zelazo, P. D. (2020). Executive Function and Psychopathology: A Neurodevelopmental Perspective. *Annual Review of Clinical Psychology*, *16*(Volume 16, 2020), 431-454. https://doi.org/10.1146/annurev-clinpsy-072319-024242

Zhang, M. X., Kam, C. C. S., & Wu, A. M. S. (2024). The reciprocity between psychological need frustration and adolescent problematic smartphone use. *Journal of Applied Developmental Psychology*, *91*, 101634. https://doi.org/10.1016/j.appdev.2024.101634

Zhou, Y., Zhou, Y., Zhou, J., Shen, M., & Zhang, M. (2022). *Attentional biases and daily game craving dynamics: An ecological momentary assessment study*. https://doi.org/10.1556/2006.2022.00085

3

GAMBLING DISORDER AS THE BASIS OF A BEHAVIORAL ADDICTION: NEUROBIOLOGICAL CONSIDERATIONS

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ABSTRACT:

Behavioral addictions are characterized by recurrent patterns of compulsive and disruptive participation that persist despite negative consequences in major areas of life functioning and overall well-being. Important features of such behaviors often involve failures to resist urges or impulses to engage in activities and repeated unsuccessful attempts to reduce or quit the behaviors. These behaviors are similar to those central to substance addictions; however, they are focused on non-substance-related behaviors rather than the consumption of psychoactive substances. Behavioral addictions may involve gambling, gaming, shopping, exercise, work, eating densely caloric and highly palatable foods, sex, pornography, social media or other foci. Although some behaviors are officially recognized as the focus of clinical disorders (e.g., gambling disorder), many remain debated regarding precise definitions, classifications, and diagnostic criteria. Nonetheless, the fifth edition of the Diagnostic and Statistical Manual (DSM-5) reclassified gambling disorder as the first formal clinical non-substance addictive diagnosis and included criteria for internet gaming disorder for research purposes. The eleventh revision of the International Classification of Diseases (ICD-11) included both gambling and gaming disorders as "disorder due to addictive behaviors." In the current work and given the amount of research over time, we will focus on gambling disorder. Epidemiology, theories regarding neurobiological and other mechanisms, potential risk factors, vulnerable populations, and intervention and treatment options will be discussed.

KEYWORDS:

addictive behaviors, impulsive behaviors, compulsive behaviors, epidemiology, gambling

1. INTRODUCTION

Non-substance addictions, also known as behavioral addictions, are characterized by compulsive and disruptive patterns of recurrent engagement in activities despite negative consequences in major areas of life functioning and overall well-being (Grant et al., 2010). Important characteristics of such behaviors include diminished control that often involves failures to resist urges or impulses to engage in activities and repeated unsuccessful attempts to reduce or quit the behaviors (Derevensky, 2019). Behavioral addictions are similar to substance addictions but are focused on behaviors not involving the consumption of psychoactive substances (Grant et al., 2010). Behavioral addictions may involve dysphoric states similar to withdrawal symptoms of substance addictions, characterized by irritability, restlessness, anxiety, and cravings. Unlike some forms of substance withdrawal, behavioral addictions generally do not present life-threatening physical withdrawal symptoms (Colon-Rivera, 2020); however, they may still lead to significant psychological distress, irritability and anxiety that can impair daily functioning.

Behavioral addictions may involve gambling, gaming, shopping, exercise, work, sex, pornography viewing, social media, or other behavioral foci. Although some behaviors are officially recognized as the focus of clinical disorders (gambling and gaming disorders recently), many remain debated regarding precise definitions, classifications, and diagnostic criteria (Brand et al., 2025a). The present chapter focuses on the one formally recognized behavioral addiction in multiple nomenclature systems: gambling disorder (GD). The estimated lifetime prevalence of GD among U.S. adults ranges from 0.2% to 2.0% (Potenza et al., 2019). Epidemiology, neurobiological mechanisms, potential risk factors, particular segments of population that are most vulnerable, and intervention and treatment options will be discussed.

GD (previously termed pathological gambling) was first introduced in the Diagnostic and Statistical Manual of Mental Disorders, 3rd edition (DSM-III) in 1980. It was previously classified as an "Impulse control disorder not elsewhere classified" (diagnostic

category 312.31). Relative to substance use disorders (SUDs), GD has been relatively understudied with fewer biological investigations exploring its underlying features and evaluating the effectiveness of treatments for GD.

In the fifth edition of DSM-V (American Psychiatric Association, 2013), GD was reclassified as an addictive disorder. In addition to reclassification, other changes going from DSM-IV-TR to DSM-5 included renaming of pathological gambling to GD, removal of the illegal acts' criterion, and lowering the diagnostic threshold for diagnosis from five to four criteria. The text describing GD was also revised and updated. This change was based upon a growing body of research that showed GD shows many similarities with SUDs, including in activation of brain reward systems, cycles of craving and withdrawal, tolerance, and continued gambling despite negative consequences. Aside from renaming the disorder, reflecting nomenclature consistency within the category and the reduction of stigma associated with the diagnostic label (i.e., removing "pathological"), the changes were based upon empirical evidence as summarized and discussed below.

The International Classification of Diseases (ICD) process mirrored some DSM considerations. The key differences between ICD-10 (1992) and ICD-11 included reclassification of GD from the Habit and Impulse Disorder category to Disorders Due to Addictive Behaviors, based on scientific and clinical evidence linking GD and SUDs (Grant et al., 2010).

2. NEUROBIOLOGY OF BEHAVIORAL ADDICTIONS

The neurobiology of GD shares many features with SUDs and involves complex interactions between the brain's neural networks and neurotransmitter systems, with specific processes implicated in the reinforcement and maintenance of addictive behaviors.

There are several biological models that may provide insight into addictive behaviors and vulnerability to addictions (Brand et al., 2019; Brand et al., 2016; Hammond et al., 2014). These models, although complimentary, explore various aspects of addictive behaviors, including a broad range of neurotransmitters and neuropeptides, including glutamate, gamma-aminobutyric acid (GABA), serotonin, dopamine and norepinephrine, among others (Kaminer, 2010). Among brain regions implicated in behavioral addictions are subcortical regions (e.g., the ventral striatum), implicated in reward processing, and the prefrontal cortex, implicated in decision-making processes, impulse control, and executive functioning. Other brain regions, implicated in interoceptive awareness, like the insula, may contribute to cravings and difficulties resisting engagement in addictive behaviors. Further, repeated exposure to certain rewarding behaviors (stimuli) may lead to neuroadaptive changes, resulting in functional (Baik, 2013) and structural changes that may promote the maintenance and progression of addictive behavioral patterns (Brand et al., 2019).

Midbrain dopamine neurons contribute to processing of reward-related information (Wise, 2004). In GD, dysregulation of reward and control systems may contribute to the reinforcement and maintenance of addictive behaviors. Engaging in gambling may generate reward signals in the ventral striatum, including in the nucleus accumbens (NAc). Either at baseline or over time, the brain may become less responsive to natural rewards and more responsive to gambling-related rewards.

Impaired executive function and dysfunction of the prefrontal cortex have been proposed to underlie GD (Friedman & Robbins, 2022). Such dysfunction may underpin disadvantageous decision-making, impaired impulse control, and poor planning, self-regulation, and self-control. Impairments in executive function may lead to poor judgment and difficulties controlling behaviors, even when individuals are aware of negative consequences. The prefrontal cortex contributes importantly to controlling impulses and making decisions by evaluating long-term risks and rewards. When prefrontal functioning is impaired, it may become more difficult for individuals to resist urges, leading to people with GD experiencing difficulties controlling gambling.

The incentive-sensitization theory (IST; Robinson & Berridge, 1993, 2008, 2025) suggests that repeated exposure to addictive behaviors leads to a sensitization of the brain's response to the signals associated with this behavior. In this theory, the brain's mesolimbic dopamine systems influence motivation (wanting) by increasing craving for addictive behaviors but may differentially influence the hedonic impact (liking) as a result of these behaviors. Some individuals may be particularly vulnerable to long-lasting sensitization of these mesolimbic systems due to drug use, which may make them crave drugs or certain behaviors more without increasing the pleasure received from using them.

The allostasis theory of addiction (Koob & Le Moal, 2004), proposes addiction as a complex process of neuroadaptive changes in the brain's stress and reward systems. In addictions, individuals may initially engage in addictive behaviors to experience pleasure. However, over time, the brain's reward system may become desensitized, stimulating the individual to engage in the behavior more frequently to maintain a sense of balance or homeostasis (a stable internal state). At the same time, a stress response system (e.g., involving the hypothalamic-pituitary-adrenal axis) may become overactive, leading to negative emotional states when the person is not engaged in the behavior. This theory has been further defined as stability through change, which proposes that neural processes may constantly adjust the brain's baseline state, which, over time, may become increasingly dependent on addictive behaviors.

Dual-process theories of addiction (Evans & Coventry, 2006) suggest that addiction involves two competing neural processes: (1) an impulsive, automatic system, related to immediate rewards, and (2) a reflective, controlling system, involved in self-regulation. The impulsive system involves the brain's reward and habit centers, such as the striatum and amygdala, which may be overly engaged in addictions. The reflective system relies on the prefrontal cortex to inhibit urges and inform reasoned decisions.

In this theory, over time, the impulsive system predominates, while the reflective system is weakened or impaired. Such imbalance may result in compulsive engagement in addictive behaviors, as individuals may find it difficult to control such behaviors or consider negative consequences.

Neuroplasticity and learning theories (Kauer & Malenka, 2007; Mameli & Lüscher, 2011) suggest that repeated engagement in addictive behaviors lead to neuroplastic synaptic changes in brain areas responsible for reward, motivation, and learning processes (such as the prefrontal cortex and striatum), and such changes in the brain may contribute to the development and maintenance of addictions. As behaviors are repeated, the brain's neural pathways are strengthened, and engagement in these actions occur without considerable forethought, making it more difficult for individuals to stop engaging in addictive behaviors.

The I-PACE (Interaction of Person. Affect, Cognition and Execution) model was initially proposed to consider addictive behaviors related to internet use (Brand et al., 2016) and then was updated to consider addictive behaviors more generally (Brand et al., 2019), with additional factors considered in greater detail over time (Brand et al., 2025b). This model considers vulnerability factors and addictive processes over time, with changes in gratification and compensation considered as behaviors often transition from more reward-driven to coping-driven over time. One recent study found that experiences of gratifications and reward may be playing a significant role in addictive behaviors (Wegmann et al., 2025). Cultural adaptations of the I-PACE have also been proposed (Lee et al., 2025).

The Elaborated Intrusion Theory of Desire (Kavanagh et al., 2005) may also help to explain the role of cravings, urges and intrusive thoughts in behavioral addictions by focusing on how desires become mentally formed, persistent and reinforced over time. When a craving arises, individuals may engage in an active imagery process and detailed thoughts about the anticipated experience, making the desire more intense. The more frequently this process occurs, the stronger the association between the behavior and the expected reward may become, reinforcing the craving and increasing the likelihood of engaging in the behavior. This theory, originally developed to explain cravings in substance use and food consumption, has also been applied to behavioral addictions like GD and other addictive disorders/behaviors (Bocci Benucci et al., 2024; Brahim et al., 2024; Brandtner et al., 2025; Cornil et al., 2018).

3. POTENTIAL RISK FACTORS

Multiple factors may contribute to the onset, development, and maintenance of behavioral addictions. Among them, biological (e.g., genetic factors, neurochemicals), psychological (e.g., individual differences in impulsivity, sensation-seeking, self-esteem, stress responsivity, and mental health conditions such as anxiety, depression,

attention-deficit/hyperactivity disorder), and environmental (e.g., familial, peer, and media considerations) factors have been implicated (Gyollai et al., 2014; Xuan et al., 2017). GD may be influenced by the complex and dynamic combination of biological, psychological, and environmental factors, specific to each individual.

3.1 Genetic and environmental factors

Studies of large twin samples have implicated genetic contributions to GD (Lobo, 2016). A meta-analytic study of twin data showed moderate genetic influence (50%) and non-shared environmental influences (50%) explaining GD, with genetic influence being stronger in adults compared to adolescents and increasing with age and GD severity.

Environmental factors (e.g., peer pressure) may have greater effects on adolescents compared to adults. Higher heritability in adults may reflect genetic predispositions for prolonged problematic engagement in gambling. Higher heritability has been suggested in men compared to women, and environmental factors may be particularly influential for GD in women (Xuan, 2017).

Broader contextual influences may also include features of national regulatory environments that may influence the nature and availability of gambling activities and the commercial practices of the gambling industry (e.g., marketing and advertising strategies) (Adams et al., 2009; Deans et al., 2017). Isolation and social connectedness may constitute seemingly contradictory risk factors for GD. Isolation, potentially resulting from loneliness, low family connectedness, and being single, has been linked to GD in younger individuals. In contrast, gambling for entertainment purposes and social engagement are common motivations for gambling among older adults, suggesting age-related differences in possible risk factors for GD.

There are limited candidate gene findings for GD (Agrawal et al., 2012). Genome-wide association studies have not identified genomic regions reaching genome-wide significance with respect to GD, although existing studies have been relatively small to date (Lang et al., 2016; Lind et al., 2013).

3.2 Sociodemographic factors

Sociodemographic factors may contribute to the development and progression of behavioral addictions. These factors include age, sex, socioeconomic status, education level, and cultural backgrounds. Frequently documented sociodemographic factors include younger age and male sex. Traditionally, males have been more likely than females to experience GD, with a 2:1 ratio. This holds true for adolescents, young adults, college students, veterans, and Indigenous groups.

Sex-related differences may be gradually narrowing and, in some populations, female sex may be a risk factor (Merkouris et al., 2016). For example, women in the military may be more vulnerable to GD than men (Westermeyer et al., 2013). Being female may also be a risk factor for GD in adults aged 50 years and older (Marks & Clark, 2018). Men and women often differ with respect to gambling motivations and preferences

(Nordmyr et al., 2014). Women tend to prefer non-strategic forms of gambling (Svensson & Romild, 2014) that may provide relaxation, a way of managing emotions, or escape from problems (Pattinson & Parke, 2017). Men are often more oriented toward strategic forms of gambling (Grant et al., 2012). Among women, low levels of family support may be a risk factor (González-Ortega et al., 2013).

Men and women differ in other aspects of GD (Fattore et al., 2014; Granero et al., 2018). First, demographic variables associated with female GD patients include older age. In addition, the development of the disorder may be faster for females, termed telescoping (Keyes et al., 2010; Marks & Clark, 2018; Zakiniaeiz et al., 2017). Another relevant factor for women may involve low levels of family support (Dowling et al., 2009; González-Ortega et al., 2013). Second, considering personality and clinical profiles, females with GD have scored lower on impulsivity and sensation seeking (Hodgins & Holub, 2015), exhibited lower likelihoods of drug and alcohol misuse (Pilver et al., 2013; Tackett et al., 2017), demonstrated lower odds of antisocial personality disorder (Echeburúa et al., 2011), and shown greater likelihoods for depressive–anxiety symptoms and histories of physical abuse and trauma (Dion et al., 2015; Ronzitti et al., 2016).

A study conducted in 2018 analyzed clinical subtypes in a sample of women seeking treatment for GD and identified three empirical clusters based on sociodemographic and clinical variables: highly dysfunctional (characterized by highest levels in problem-gambling severity, co-occurring psychopathology, novelty seeking, and harm avoidance, and low self-directedness and cooperativeness); dysfunctional (achieving medium mean scores in problem-gambling severity and psychopathological symptoms); and functional (with low problem-gambling severity. psychopathology, novelty seeking, harm avoidance, and self-transcendence, and high self-directedness and cooperativeness) (Granero et al., 2018).

Sociodemographic factors linked to GD also include low incomes or living in poverty (Hahmann et al., 2020), unemployment (Spångberg & Svensson, 2020), and low educational attainment (Hing et al., 2016). Poverty and financial hardships may influence decision-making in manners that may exacerbate poverty (Mani et al., 2013; Haushofer & Fehr, 2014).

3.3 Co-occurring disorders

Other potential risk factors include co-occurring psychiatric disorders and physical health problems. As in the general population, most treatment-seeking patients with GD experienced other psychiatric disorders including anxiety, mood, and personality disorders (Dowling et al., 2015).

Gambling may be used as a maladaptive coping mechanism, helping to escape stress, anxiety, and depression in the short term (Jauregui et al., 2017). GD and substance use appear interrelated (Caldeira et al., 2017). Specifically, GD has been strongly associated with SUDs, with odds ratios ranging from 3.9 for nicotine dependence to 5.8 for alcohol or drug dependence in a nationally representative sample of U.S. adults (Kessler et al.,

2008). An independent nationally representative U.S. survey found that 73% of adults with GD have co-occurring alcohol-use disorders, 38% co-occurring drug-use disorders, and 60.4% nicotine dependence (Petry et al., 2005).

Alcohol-use problems and conduct disorder statistically predicted GD in a representative sample of U.S. adolescents, with odds ratios of 3.9 and 2.9, respectively (Barnes et al., 2011). In most cases, co-occurring disorders precede GD (Kessler et al., 2008). Prevalence estimates for GD of 4.3% have been reported in individuals receiving treatment for SUDs, 6.9% in psychiatric inpatients (Cowlishaw & Hakes, 2015), and 3.4–7% in patients with neurological conditions, including Parkinson disease (Weintraub et al., 2010).

One study found that 45% of treatment-seeking individuals with GD had at least one co-occurring behavioral addiction (Tang et al., 2020). Problem-gambling severity and gambling-related cognitions have been linked to poor emotion regulation and coping strategies (Estevez et al., 2021).

4. VULNERABLE GROUPS

Certain subgroups of individuals may be particularly vulnerable to developing GD. Vulnerable groups may include adolescents and young adults, older adults, specific gender groups, military and veteran groups, certain ethnic and racial minority groups, individuals with co-occurring mental disorders, and incarcerated and homeless populations. Differences may include types of addictions (as certain behaviors may be more prevalent in one gender compared to the other), underlying motivations (i.e., the reasons behind engaging in addictive behaviors), psychological factors, and patterns of behavior.

4.1 Adolescents and young adults

Adolescents and young adults are considered a high-risk group for developing behavioral addictions, related to developmental characteristics. Prevalence of GD in adolescence and young adults is 0.2–12.3% (Stefanovics & Potenza, 2022) and the global prevalence of internet gaming disorder in adolescence and young adults has been estimated at 9.9% (Gao et al., 2022). Adolescence, the period between childhood and early adulthood that includes high-school years, is a period of development characterized by elevated estimates of impulsive and risk-taking behaviors as brain development is still occurring, and teens may be more vulnerable to gambling and gambling-related problems (Winters & Arria, 2011). Strong motivational drives and immature executive functioning may increase impulsivity and risk-taking behaviors during adolescence compared to childhood or adulthood (Chambers & Potenza, 2003). Motivational characteristics, such as excitement-seeking, have been linked to behavioral addictions (Farhat et al., 2021). Adolescents may have an increased sensitivity to rewards, which may make immediate rewards from gambling particularly attractive. Risk-taking behavior in adolescents may

be explained by relatively weak behavioral control functioning combined with high sensitivity for reward (Peeters et al., 2017). Similar to adults experiencing GD, adolescents with GD report having a preoccupation with gambling; repeated attempts at recouping losses; increasing wagers to reach a physiological level of excitement; lying to family members, peers, and friends about their gambling; and exhibiting anxiety and depression when trying to reduce their gambling. Adolescents may gamble to psychologically escape daily problems (parental, peer, and school-related) and other mental health concerns, and gambling may be used as a coping mechanism.

The development of GD and other behavioral addictions in adolescents may involve a complex combination of biological, psychological, and social factors (Derevensky & Gilbeau, 2015). Sociodemographic profiles include older age and male sex (Olason et al., 2011; Stefanovics et al., 2023). Older versus younger adolescent males may gamble more often (Camirand, 2014), bet high amounts of money, and face more consequences of gambling (Castrén et al., 2018).

Other potential risk factors may include associations with substance use and mental health (Estevez et al., 2015; Martínez-Loredo et al., 2019), delinquency (Kryszajtys et al., 2018), exposure to gambling activities through family and community (Shead et al., 2010), personality features such as impulsivity (Allami et al., 2018) and sensation-seeking (Estevez et al., 2015; Leeman et al., 2014).

Protective factors may include female sex (Carneiro et al., 2020), adaptive coping strategies (Studer et al., 2016), emotional intelligence and school connectedness (Shead et al., 2010), well-being, self-monitoring, personal and social competence, resilience, interpersonal skills, social support (Mishra et al., 2019), parental involvement and monitoring (Hayer & Griffiths, 2015). Additionally, adolescents' gambling may depend upon local availability/accessibility and the geographical proximity of gambling venues. Technological advances, increased opportunities, and expanded availability of remote forms of gambling via smartphones and the internet have been associated with a rise in the number of young people who gamble on a regular basis. In fact, specific characteristics of internet gambling such as its accessibility, affordability, convenience, and anonymity may facilitate gambling. Online gambling may occur without effective age verification and parental control. A systematic review on problematic online gambling found that between 0.77% and 57.5% of adolescents present some degree of GD depending on the instruments used, the study samples, and the timeframe analyzed (Montiel et al., 2021). Given the greater accessibility, availability, and promotion of gambling, many young adults have become attracted to the apparent excitement, entertainment, and financial opportunities associated with gambling. The development of new technologies may not only entice more adolescents to engage in online gambling (Calado & Griffiths, 2016), but also generate potential problems such as cyberbullying (Makri-Botsari & Karagianni, 2014) or internet addiction (Casaló & Escario, 2019; Faltýnková et al., 2020; Filiz, 2015; Malak et al., 2017; Salmela-Aro et al., 2017), and these may be linked to gambling-related problems later in life.

4.2 College students and emerging adults

College students may also be vulnerable to GD and other behavioral addictions. GD estimates among college students range from 5.37–10.41% (Blinn-Pike et al., 2007), with 75% reported to have gambled during the past year (Barnes et al., 2010). Similarly, internet gaming disorder is reported by 10.4% of young adults (Gao et al., 2022). Individuals between 18 and 25 years of age, also termed emerging adults (Arnett, 2005), have demonstrated high prevalence estimates of alcohol and drug use, gambling, gaming, and other risky behaviors. College students are particularly vulnerable to developing GD due to the combination of multiple interactive risk factors, sometimes described as the "Five A's.", including Age, Availability, Acceptability, Advertising and Access to financial resources.

Emerging adulthood is marked by risk-taking, identity exploration, instability, and self-exploration with limited parental and social controls. GD is especially notable among college students as many have the resources, proximity, free time, and desire to gamble. One study found the overall prevalence of GD among college students to be 0.4% (Grant et al., 2019) and another found that 6.1% of emerging adults are at-risk for GD, with 2.2% for both GD and problem gambling (Mills et al., 2020). The highest estimates of GD were found among males, minorities, students who had been arrested for non-traffic violations, and those who had misused alcohol and other drugs.

The transition to college is often associated with significant changes in life and with new academic challenges and social pressures (Leppink et al., 2016). This time might be particularly stressful, and students may turn to gambling as a mean to manage stress and cope with negative emotions. Despite more developed executive functions, college students may still exhibit impulsive behaviors, including excessive gambling (Buelow et al., 2015). Individual factors may also potentially influence relationship between stressful life events and gambling (Wang et al., 2020).

4.3 Military personnel and veterans

Military members and veterans may be at high risk for developing GD given frequent stressors and specific experiences associated with military service, including combat and prolonged exposure to high-stress environments. Needs to manage emotional distress and cope with negative emotions or feelings experienced by military members and veterans may contribute to GD (Stefanovics et al., 2017a). Military personnel may also exhibit high levels of risk-taking and sensation-seeking (Breivik et al., 2019).

Gambling may be particularly impactful on military life, as gambling opportunities are available on or near most military U.S. bases (Steenbergh et al., 2008). It is also a popular recreational activity among service members on bases as it may help alleviate stress, boredom, and isolation that may be experienced once deployed or upon returning home from active duty (Paterson et al., 2021).

Returning from active duty, veterans may also face difficulties adjusting to civilian life after leaving the military. This transition may involve significant changes in social life

and daily routines, mental health concerns, and substance use contributing to increased vulnerability to developing GD (Bowes et al., 2018; Shirk et al., 2018).

4.3.1 *Military personnel*

Although the prevalence of GD among U.S. military service members may be relatively low compared to civilians, being in the military, whether on active duty or as a veteran, was a significant statistical predictor of developing GD (van der Maas & Nower, 2021). Given that most U.S. military personnel are male (84%), younger than 30 years (72%), and with less than a college degree (92%) (Department of Defense, 2016), service members share demographic characteristics associated with GD (Gallaway et al., 2019).

As reported by the U.S. Government Accountability Office (GAO), based on the Military System Records of the Department of Defense (DOD), less than 0.03% of active-duty service members were diagnosed with GD each year during fiscal years 2011–2015 or seen for GD within the healthcare system (Etuk et al., 2020). This percentage likely underestimates cases as numbers were drawn from diagnostic health records, reflecting service members who sought treatment and were diagnosed with GD by providers. Additionally, it is difficult to detect individuals with gambling problems partly because of perceived stigma in seeking mental health treatment in the military.

Another recent study found that the 10-year prevalence of GD was 6.6 per 100,000, with men being 3.5 times more likely than women to receive a GD diagnosis (Garvey Wilson et al., 2021). Other linked factors included age, minority ethnic group status, being unmarried, and enlisted rank. The odds of GD increased with duration and proximity to gambling venues, substance misuse, mental health conditions, and legal problems (Gallaway et al., 2019; Garvey Wilson et al., 2021). Among military-specific factors, it was noted that service members in combat occupations were less likely to have GD. Overall GD estimates were lower in the Army than in the Air Force, Marines, or Navy (Garvey Wilson et al., 2021).

Although most U. S. military studies have been focused on men and women showed lower GD overall, women in the military may be more vulnerable to GD than men. For example, Westermeyer and colleagues (2013) found 3.6% of female veterans met criteria for GD. However, a more recent study of National Guard Members found that female sex was negatively correlated with problem gambling (Gallaway et al., 2019).

Regarding forms of gambling, online gambling may be particularly attractive to active-duty members given their increased tendency for risk-taking in addition to increased restrictions in leisure options (Bray et al., 2010). Active-duty military personnel who experience mental health and substance use problems may also initiate gambling as an avoidant stress coping strategy (van der Maas & Nower, 2021). Given the current context of rapid expansion in gambling access—particularly online gambling—and specifics of military service, past and present military service members may be at particular risk of developing GD.

4.3.2 *Veterans*

Veterans may be vulnerable to mental health problems post-deployment (Whiting et al., 2016). Reported prevalence estimates of GD in veterans have ranged from 0.2% found in the sample of veterans using Veterans Affairs health system data to 2.2% in a representative sample of U.S. veterans (Stefanovics et al., 2017b) to 8.8%–10.7% found in a clinical sample of veterans (Westermeyer et al., 2013), homeless (Olson-Madden et al., 2012), and American Indian veterans (Westermeyer et al., 2005). However, standardized screening for GD is not implemented across Veterans Administration (VA) hospitals, which also suggests that diagnosed GD issues may only represent the most severe cases. Additionally, veterans with gambling problems may be reluctant to seek treatment (Shirk et al., 2018), which might explain the low rates of GD in VA reports.

Factors linked to GD in veterans resemble those in active military populations and include younger age, male sex, minority status, trauma and stressful life events (Dighton et al., 2018; Stefanovics et al., 2017b; Whiting et al., 2016), homelessness (Harris, Kintzle, Wenzel, & Castro, 2017; Roberts et al., 2017), limited post-deployment social support (Whiting et al., 2016), female sex (Westermeyer et al., 2013), having friends and family members engaged in gambling (Freeman et al., 2020), and psychiatric and substance use concerns (Etuk et al., 2020).

4.4 Specific populations

4.4.1 *Homeless individuals*

Homelessness has been linked to GD, perhaps due to psychological and socio-environmental factors. Unstable housing conditions may create uncertainties and everyday challenges in finding food, safety, and basic needs, creating emotional distress. Many individuals experiencing homelessness also have histories of trauma or co-occurring psychiatric conditions linked to substance use or emotional distress. Limited social support and unstable network systems may create isolation and may, in turn, exacerbate vulnerability to behavioral addictions, as individuals may use addictive behaviors to cope with or avoid negative emotions or symptoms (Barrett & Murphy, 2021).

Concerns exist about co-occurring gambling and homelessness. High levels of GD have been seen in homeless samples internationally, in the U.S. (Nower et al., 2015), Canada (Matheson et al., 2014), and in the U.K. (Bramley et al., 2018; Sharman et al., 2015; Sharman et al., 2016). Although a causal association has not been established, the relationship appears bi-directional. Some studies suggest gambling is a direct route to homelessness (Sharman et al., 2016), while other research suggests gambling is triggered by homelessness, with evidence of the latter found in high- as well as in middle- and low-income countries (Hamilton-Wright et al., 2016; Saldanha & Madangopal, 2019; Woodhall-Melnik et al., 2019). Additionally, co-occurring concerns (e.g., substance use, mental conditions, trauma) and structural factors (e.g., gambling accessibility, poverty, housing insecurity) may promote gambling (Deutscher et al., 2023). Furthermore, because gambling in homeless populations may be frequently hidden and overlooked by

service providers, it may often go unaddressed. Gambling in older adults may contribute to the onset of first-time homelessness (Vandenberg et al., 2021).

GD has been reported in multiple homeless samples (Harris et al., 2017; Sharman, 2019). Specifically, GD has been associated with increased odds of homelessness in veterans (Harris et al., 2017). Veterans may engage in gambling following military-associated trauma including from experiences of combat (Strom et al., 2012). Gambling may intensify following military service (Thomsen et al., 2011).

Persons who experience homelessness are often highly stigmatized and may be unlikely to seek help for GD (Baxter et al., 2016). Agencies serving homeless individuals should assess for GD (Nower et al., 2015).

4.4.2 *Prison populations*

Prison environments, where stress, boredom, and isolation are common, may contribute to the development of GD (Blaauw et al., 2000). Inmate gambling is common, perhaps normative, with inmates and corrections officers/staff members reporting that over 50% of inmates gamble on a regular basis (McEvoy & Spirgen, 2012). According to a systematic review, prevalence estimates of problem and disordered gambling in prison populations range from 5.9% to 73% (Banks et al., 2020). Prevalence estimates of gambling problems have ranged from 10.4% to 73% and from 5.9% to 45% in female prisoners (Riley & Oakes, 2015; Riley et al., 2018).

GD prevalence was higher in Indigenous Australian prisoners (75%) versus non-Indigenous prisoners (57%), with particularly infrequent help-seeking (Riley et al., 2018). In a pilot study at a correctional facility in Finland, the GD prevalence estimate rate was 16.3%, compared to 3.3% in the general population (Lind et al., 2019). GD in prison populations often co-occurs with alcohol and drug use, and mental conditions (Banks et al., 2020).

As inmates show high prevalence estimates of GD, screening is recommended across penal institutions and other criminal justice organizations, with a view to better understand and address concerns. Identification and treatment while in custody may promote better re-entry into society. In U.S. federal prisons, gambling, possession of gambling equipment, or preparing or conducting a gambling pool is classified as a moderate category offense in the Inmate and Custodial Management Policy of the Federal Bureau of Prisons (Williams et al., 2005). Due to its official prohibition, gambling in prison is difficult to study. Prisoners may be reluctant to disclose their activities for fear of personal consequence or fear that prison regulations or procedures may become more restrictive.

4.4.3 *Indigenous populations*

Indigenous populations often face unique challenges that intersect with GD, particularly due to historical trauma, socioeconomic challenges and cultural aspects (Soto et al., 2022). Limited research exists on GD within Indigenous population. Gambling is part

of the social and cultural fabric of many Indigenous communities (Hing & Breen, 2014). Several studies have identified high gambling involvement and elevated prevalence of GD in the Indigenous populations of several former British colonies, including Canada, Australia, New Zealand, and the U.S. Colonization and culture change has had negative impacts on many Indigenous peoples, which may make them vulnerable to gambling.

In the Indigenous population of Australia, risk factors for GD include being male (Hing et al., 2014a), female (Hing et al., 2014b; Stevens & Young, 2010), working part-time, being separated/divorced or widowed (Hing et al., 2014a; Hing et al., 2014c), having high incomes (Stevens & Young, 2010), childhood exposure to gambling, having friends or family members who gamble (Hing et al., 2014c), and being either socially marginalized (Breen et al., 2013) or connected (Stevens & Young, 2010), stress, anxiety, grief and loss, loneliness (Hing & Breen, 2014; Hing et al., 2014b; Russell et al., 2021), substance misuse, and psychological distress (Tulloch et al., 2020). Environmental factors include living in a remote location (Stevens & Young, 2010), gambling behavior and motivations, increased availability, early gambling onset (Breen, 2012; Hing et al., 2014a; Hing et al. 2014d), type of gambling (Hing & Breen, 2014; Young et al., 2008), use of non-monetary stakes (Breen, 2012), superstitious ties to 'lucky' poker machines (Breen et al., 2011), and less access to a doctor (Stevens & Bailie, 2012). In general, problematic gambling in this population has been related to the social and environmental contexts in which it occurs (Stevens & Young, 2010).

In New Zealand culture, gambling may serve as a form of recreation and used to relieve stress (Tse et al., 2012). Easy access (Lin et al., 2011), early onset of gambling, and legitimizing gambling as a safe activity (Morrison, 2017) have been identified as important factors for developing GD. Normalizing gambling as a part of culture may generate a mixture of gambling and cultural beliefs based on collectivism, gift-giving, gambling-based fundraising, and beliefs about blessing—all of which may contribute to the development of GD (Breen & Gainsbury, 2013; Kolandai-Matchett et al., 2017). Furthermore, poker machines are often concentrated in low-income areas, potentially facilitating the development of gambling problems (Tse et al., 2012; Walker et al., 2012).

North American Aboriginals have a particularly extensive tradition of gambling. Historically, virtually all tribes engaged in gambling (Williams et al., 2011). Studies suggest that Aborigines in North America are 2–3 times more likely to develop GD than Caucasians or non-aboriginal populations (Patterson et al., 2015; Wolf et al., 2015). Research of Canadian Aboriginal peoples has identified potential risk factors, including younger age, disadvantageous social conditions (e.g., poverty, unemployment, poor education, cultural stress), gambling availability and intensity, greater participation in continuous forms of gambling (e.g., electronic gambling machines), substance misuse and mental health concerns (e.g., anxiety and depression) (Williams et al., 2016), childhood sexual abuse (Dion et al., 2015), traumatic life events (Gill et al., 2016), and social trauma (Hagen et al., 2013), and these have been linked to GD in North American Aboriginals (Gill et al., 2016).

In the U.S. population of American-Indian/Alaska natives, GD has been associated with major depression, generalized anxiety disorder, nicotine dependence, personality disorders (Kong et al., 2016; Soto et al., 2022), other substance misuse, and mood swings. Further potential risk factors for Native Americans may include neighborhood disadvantage (Barnes et al., 2017) and lower socioeconomic status (Wolf et al., 2015).

Many factors linked to GD in Indigenous groups are modifiable (Williams et al., 2021). As such, interventions may target these factors preferentially.

5. TREATMENT OPTIONS

Treatments for GD may address psychological and physiological aspects of addiction and include counseling, cognitive behavioral therapy (CBT), mindfulness and stress reduction therapy, and support groups (Eriksen et al., 2023; Sancho et al., 2018), among others. Individualized approaches may depend on the type and severity and duration of GD. Pharmacological treatments may also be indicated, particularly for co-occurring disorders (Piquet-Pessoa & Fontenelle, 2016).

5.1 Behavioral interventions

5.1.1 ***Cognitive behavioral therapy (CBT)*** is arguably the most empirically validated and effective treatment for GD. CBT helps individuals to identify and change distorted thinking patterns and behaviors associated with GD. CBT focuses on understanding triggers and developing healthier coping mechanisms. A recent systematic review of treatments for GD found benefits of CBT in the short term, with only a few studies having investigated longer-term benefits (Petry et al., 2017).

5.1.2 ***Motivational interviewing (MI)*** may help individuals engage in treatment by identifying potential barriers and addressing them. Elements include the assessment of a person's readiness for change; assuming a non-judgmental, non-confrontational, and non-adversarial position; and using interventions that involve open-ended questions, affirmations, reflective listening, and brief summarizations (Miller & Rollnick, 2012). Although a literature review found that the effect of MI may decline over time, it might be particularly effective in the short-term (Yakovenko et al., 2015) and if used with other therapies (e.g., self-help workbook or self-directed online programs) (Brazeau et al., 2021). One randomized controlled study examined MI versus CBT in treatment of GD and found no difference at any point in time. Instead, both MI and CBT yielded significant within-group decreases on most outcome measures up to the 12-month follow-up. Both forms of intervention were superior to the non-treatment control group (Carlbring et al., 2010). Culturally sensitive treatment options such as MI and CBT have been identified as effective treatments for GD with culturally diverse populations (Richard et al., 2017).

5.1.3 ***Dialectical Behavior Therapy (DBT)***, originally developed for borderline personality disorder (BPD), was found to be effective in the treatment of GD (Christensen et al., 2013; Linehan, 2020). DBT is based on an interaction of vulnerabilities and emotional regulation difficulties during stressful situations. DBT focuses on measuring changes in four process skills: mindfulness, distress tolerance, emotion dysregulation, and negative relationships (McIntosh et al., 2017).

5.1.4 ***Acceptance and Commitment Therapy (ACT)*** focuses on accepting negative emotions, thoughts, and feelings while committing to behaviors aligned with personal values. It helps individuals develop psychological flexibility and reduce the power of cravings (Hitch et., 2023; McIntosh et al., 2017).

5.1.5 ***Contingency management (CM)*** and exposure therapy (ET) are two evidence-based behavioral intervention approaches. The first, CM, involves the identification of the target behavior and provision of the rewards or incentives for positive behavioral changes and abstinence from the addictive behavior. It is commonly used in addiction treatment to reinforce desirable behavior (Christensen, 2013; Dorey et al., 2022; McGarrigle et al., 2024). ET helps reduce gambling cravings and severity, decreases the time spent gambling, and addresses erroneous beliefs associated with gambling (Bergeron et al., 2022). It helps individuals to gradually face and overcome triggers associated with GD.

5.1.6 ***Self-support and peer-support groups*** include Gamblers Anonymous that provides support through a structured 12-step approach and group meetings, where individuals can share their experiences and receive encouragement from others with similar struggles (Humphreys, 2003). Less structured peer-support settings may also provide a sense of community and reintegration. Groups like SMART Recovery focus on self-empowerment and evidence-based techniques (Beck et al., 2017; Grady et al., 2024; Horvath & Yeterian, 2016).

5.1.7 ***Self-directed interventions*** involve managing one's addictive behavior through personal strategies, without professional supervision. Many internet-based applications for GD have not been formally tested, although some elements (e.g., CBT elements) have been associated with more favorable ratings (McCurdy et al., 2023). Several *self-directed interventions* for GD have been also established, including a self-help workbook for GD based on cognitive-behavioral principles. Some guided and unguided internet intervention options may not achieve target outcomes, perhaps due to a lack of contact with a therapist (Cunningham et al., 2019). However, other such interventions show promise (Rolvien et al., 2024). Differential improvement has been reported when online treatments have been accompanied by brief telephone calls (LaBrie et al., 2012) or personalized e-mails (Luquiens et al., 2016) providing instructions and support. Finally, recent randomized

controlled trials suggest that supplementing online self-directed treatment programs with a single digitally delivered MI session may be beneficial (Brazeau et al., 2021).

5.1.8 ***Ecological momentary interventions (EMIs)*** are self-directed, smartphone-based real-time interventions delivered in an individual's natural environment at specifically identified moments of everyday life based on ecological momentary assessments (EMAs) (Loo Gee et al., 2016). These interventions are designed to help individuals manage gambling urges, behaviors, or consequences by providing support the moment they are needed, rather than relying on traditional in-person therapy. To identify when an EMI is needed, apps administer real-time EMA of relevant situations at random or prespecified times. Based on EMA results, apps apply decision rules to determine the time, type, and intensity of the EMI delivered (Heron & Smyth, 2010).

Although EMIs are increasingly employed in the mental health and addiction field, smartphone app-delivered EMIs have been reported for gambling (Khazaal et al., 2017; Merkouris et al., 2020). One app, Jeu-contrôle, aims to help people adhere to gambling time and money limits by delivering personalized feedback about current gambling behavior compared with preset limits recorded during EMAs (Khazaal et al., 2017). Another, GamblingLess: Curb Your Urge, is tailored by responses to prompted EMA for gambling craving management (Merkouris et al., 2020). The results of one of recent study (Hawker et al., 2021) supports the acceptability and preliminary effectiveness of this app-delivered intervention for preventing gambling episodes through craving management.

5.2 Pharmacological treatment options

Combining psychotherapy, support systems, and lifestyle changes with appropriate pharmacological interventions may be helpful for individuals trying to manage their addiction and work towards recovery. While there are no medications specifically indicated for GD or other behavioral addictions, there are certain pharmacological treatment options that can be used off-label or to treat co-occurring conditions. Pharmacological treatments may be divided into four categories: (1) antidepressants, (2) opioid antagonists, (3) mood stabilizers, and (4) atypical antipsychotics.

Antidepressants used to address GD may include selective serotonin reuptake inhibitors (SSRIs) such as fluvoxamine, paroxetine, sertraline, and escitalopram. The class of medications that has received the greatest attention for GD treatment is opioid-receptor antagonists, such as naltrexone (Kraus et al., 2020). Naltrexone is an anti-craving pharmacological agent demonstrated to be effective in the treatment of SUDs (Murphy IV et al., 2022; Syed & Keating, 2013), potentially reducing rewarding effects of substances such as alcohol and opioids. One meta-analysis suggested improvements in treatment of GD with naltrexone and nalmefene compared to placebo (Ioannidis et al., 2024).

Other research has evaluated the use of mood stabilizers (e.g., lithium, which has been studied for its potential to reduce impulsivity and stabilize mood in individuals

with GD, especially those with co-occurring bipolar symptoms), and atypical antipsychotics (e.g., olanzapine, which has not demonstrated efficacy) (Potenza et al., 2019). Less commonly evaluated pharmacological agents include glutamatergic agents (e.g., N-acetyl cysteine and memantine) and atypical stimulants (e.g., modafinil). Although several open-label studies have shown potential benefits, double-blind, placebo-controlled trials have often demonstrated a mixed result, providing limited support for the use of any pharmacological agent (Bartley & Bloch, 2013). Although the systematic study of pharmacotherapy treatment efficacy and tolerability for GD is in the early stages, specific drug therapies hold promise for treatment.

6. CONCLUSION

GD involves complex interaction between neural, cognitive, emotional processes, reinforcing compulsive engagement in betting, with other behaviors also being the potential focus of addictions (Brand et al., 2025a). Given that GD is a more established entity than other behavioral addictions, this chapter largely focuses on GD. As more data emerge on other behavioral addictions, similar consideration of other behavioral addictions warrant consideration.

REFERENCES

Adams, P. J., Raeburn, J., & De Silva, K. (2009). A question of balance: prioritizing public health responses to harm from gambling. *Addiction, 104*(5), 688-691.

Agrawal, A., Verweij, K., Gillespie, N., Heath, A., Lessov-Schlaggar, C., Martin, N., ... Lynskey, M. (2012). The genetics of addiction—a translational perspective. *Translational psychiatry, 2*(7), e140-e140.

Allami, Y., Vitaro, F., Brendgen, M., Carbonneau, R., & Tremblay, R. E. (2018). Identifying at-risk profiles and protective factors for problem gambling: A longitudinal study across adolescence and early adulthood. *Psychology of Addictive Behaviors, 32*(3), 373.

American Psychiatric Association, D., & American Psychiatric Association, D. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (Vol. 5): American psychiatric association Washington, DC.

Arnett, J. J. (2005). The developmental context of substance use in emerging adulthood. *Journal of Drug Issues, 35*(2), 235-254.

Baik, J.-H. (2013). Dopamine signaling in reward-related behaviors. *Frontiers in neural circuits, 7*, 152.

Banks, J., Waters, J., Andersson, C., & Olive, V. (2020). Prevalence of gambling disorder among prisoners: a systematic review. *International journal of offender therapy and comparative criminology, 64*(12), 1199-1216.

Barnes, G. M., Welte, J. W., Hoffman, J. H., & Tidwell, M.-C. O. (2010). Comparisons of gambling and alcohol use among college students and noncollege young people in the United States. *Journal of American College Health, 58*(5), 443-452.

Barnes, G. M., Welte, J. W., Hoffman, J. H., & Tidwell, M. C. O. (2011). The co-occurrence of gambling with substance use and conduct disorder among youth in the United States. *The American journal on addictions, 20*(2), 166-173.

Barnes, G. M., Welte, J. W., & Tidwell, M. C. O. (2017). Gambling involvement among Native Americans, blacks, and whites in the United States. *The American journal on addictions, 26*(7), 713-721.

Barrett, A. K., & Murphy, M. M. (2021). Feeling supported in addiction recovery: Comparing face-to-face and videoconferencing 12-step meetings. *Western Journal of Communication, 85*(1), 123-146.

Bartley, C. A., & Bloch, M. H. (2013). Meta-analysis: pharmacological treatment of pathological gambling. *Expert review of neurotherapeutics, 13*(8), 887-894.

Baxter, A., Salmon, C., Dufresne, K., Carasco-Lee, A., & Matheson, F. I. (2016). Gender differences in felt stigma and barriers to help-seeking for problem gambling. *Addictive Behaviors Reports, 3*, 1-8.

Beck, A. K., Forbes, E., Baker, A. L., Kelly, P. J., Deane, F. P., Shakeshaft, A., ... Kelly, J. F. (2017). Systematic review of SMART Recovery: Outcomes, process variables, and implications for research. *Psychology of Addictive Behaviors, 31*(1), 1.

Bergeron, P.-Y., Giroux, I., Chrétien, M., & Bouchard, S. (2022). Exposure therapy for gambling disorder: systematic review and meta-analysis. *Current Addiction Reports, 9*(3), 179-194.

Blaauw, E., Roesch, R., & Kerkhof, A. (2000). Mental disorders in European prison systems: Arrangements for mentally disordered prisoners in the prison systems of 13 European countries. *International Journal of Law and Psychiatry, 23*(5-6), 649-663.

Blinn-Pike, L., Worthy, S. L., & Jonkman, J. N. (2007). Disordered gambling among college students: A meta-analytic synthesis. *Journal of gambling studies, 23*(2), 175-183.

Bocci Benucci, S., Tonini, B., Roffo, G., Casale, S., & Fioravanti, G. (2024). The application of the metacognitive model of desire thinking and craving in problematic social networking sites use. *Psychiatric Quarterly, 95*(1), 1-16.

Bowes, M. A., Ferreira, N., & Henderson, M. (2018). The influence of psychosocial factors

in veteran adjustment to civilian life. *Clinical Psychology & Psychotherapy, 25*(4), 583-600.
Brahim, F. B., Cruz, G. V., Courtois, R., May, J., & Khazaal, Y. (2024). Strength of Pornography Craving Experience (PCE-S): Psychometric properties of a new measure based on the elaborated intrusion theory of desire. *Addictive behaviors, 148*, 107858.
Bramley, S., Norrie, C., & Manthorpe, J. (2018). Gambling-related harms and homelessness: findings from a scoping review. *Housing, Care and Support*.
Brand, M., Antons, S., Bőthe, B., Demetrovics, Z., Fineberg, N. A., Jimenez Murcia, S., King, D. L., Mestre-Bach, G., Moretta, T., Müller, A., Wegmann, E., & Potenza, M. N. (2025a). Current advances in behavioral addictions: From fundamental research to clinical practice. *American Journal of Psychiatry, 182(2)*,155-163.
Brand, M., Müller, A., Wegmann, E., Antons, S., Brandtner, A., Müller, S. M., Stark, R., Steins-Loeber, S., & Potenza, M. N. (2025b). Current interpretations of the I-PACE model of behavioral addictions. *Journal of Behavioral Addictions 14(1)*,1-17.
Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience & Biobehavioral Reviews, 104*, 1-10.
Brand, M., Young, K. S., Laier, C., Wölfling, K., & Potenza, M. N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience & Biobehavioral Reviews, 71*, 252-266.
Brandtner, A., Brand, M., & Müller, A. (2025). Mental imagery in the context of online compulsive buying-shopping disorder: The role of pleasure and relief. *Addictive Behaviors Reports*, 100586.
Bray, R. M., Pemberton, M. R., Lane, M. E., Hourani, L. L., Mattiko, M. J., & Babeu, L. A. (2010). Substance use and mental health trends among US military active duty personnel: key findings from the 2008 DoD Health Behavior Survey. *Military medicine, 175*(6), 390-399.
Brazeau, B. W., Hodgins, D. C., Cunningham, J. A., Bennett, K., & Bennett, A. (2021). Augmenting an online self-directed intervention for gambling disorder with a single motivational interview: Study protocol for a randomised controlled trial.
Breen, H. (2012). A model of Indigenous commercial gambler profiles in north Queensland, Australia. *International Gambling Studies, 12*(1), 23-37.
Breen, H., & Gainsbury, S. (2013). Aboriginal gambling and problem gambling: A review. *International Journal of Mental Health and Addiction, 11*(1), 75-96.
Breen, H., Hing, N., & Gordon, A. (2013). Indigenous Australian gambling crime and possible interventions: a qualitative study. *Asian Journal of Gambling Issues and Public Health, 3*(1), 1-16.
Breen, H. M. (2012). Risk and protective factors associated with gambling consequences for Indigenous Australians in north Queensland. *International Journal of Mental Health and Addiction, 10*(2), 258-272.
Breen, H. M., Hing, N., & Gordon, A. (2011). Indigenous gambling motivations, behaviour and consequences in Northern New South Wales, Australia. *International Journal of Mental Health and Addiction, 9*(6), 723-739.
Breivik, G., Sand, T. S., & Sookermany, A. M. (2019). Risk-taking and sensation seeking in military contexts: A literature review. *Sage open, 9*(1), 2158244018824498.
Buelow, M. T., Okdie, B. M., & Cooper, A. B. (2015). The influence of video games on executive functions in college students. *Computers in Human Behavior, 45*, 228-234.
Calado, F., & Griffiths, M. D. (2016). Problem gambling worldwide: An update and systematic review of empirical research (2000–2015). *Journal of behavioral addictions, 5*(4), 592-613.

Caldeira, K. M., Arria, A. M., O'Grady, K. E., Vincent, K. B., Robertson, C., & Welsh, C. J. (2017). Risk factors for gambling and substance use among recent college students. *Drug and alcohol dependence, 179*, 280-290.

Carlbring, P., Jonsson, J., Josephson, H., & Forsberg, L. (2010). Motivational interviewing versus cognitive behavioral group therapy in the treatment of problem and pathological gambling: A randomized controlled trial. *Cognitive Behaviour Therapy, 39*(2), 92-103.

Carneiro, E., Tavares, H., Sanches, M., Pinsky, I., Caetano, R., Zaleski, M., & Laranjeira, R. (2020). Gender differences in gambling exposure and at-risk gambling behavior. *Journal of gambling studies, 36*(2), 445-457.

Casaló, L. V., & Escario, J.-J. (2019). Predictors of excessive internet use among adolescents in Spain: The relevance of the relationship between parents and their children. *Computers in Human Behavior, 92*, 344-351.

Castrén, S., Kontto, J., Alho, H., & Salonen, A. H. (2018). The relationship between gambling expenditure, socio-demographics, health-related correlates and gambling behaviour—a cross-sectional population-based survey in Finland. *Addiction, 113*(1), 91-106.

Chambers, R. A., & Potenza, M. N. (2003). Neurodevelopment, impulsivity, and adolescent gambling. *Journal of gambling studies, 19*(1), 53-84.

Christensen, D. R. (2013). Contingency management literature review: Application to problem gambling counselling. *Gambling Research: Journal of the National Association for Gambling Studies (Australia), 25*(1), 3-17.

Christensen, D. R., Dowling, N. A., Jackson, A. C., Brown, M., Russo, J., Francis, K. L., & Umemoto, A. (2013). A proof of concept for using brief dialectical behavior therapy as a treatment for problem gambling. *Behaviour Change, 30*(2), 117-137.

Cornil, A., Lopez-Fernandez, O., Devos, G., de Timary, P., Goudriaan, A.E., & Billieux, J. (2018). Exploring gambling craving through the elaborated intrusion theory of desire: A mixed methods approach. International Gambling Studies, 18, 1-21.

Colon-Rivera, H. (2020). Behavioral addiction. *Absolute Addiction Psychiatry Review: An Essential Board Exam Study Guide*, 231-241.

Cowlishaw, S., & Hakes, J. K. (2015). Pathological and problem gambling in substance use treatment: Results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *The American journal on addictions, 24*(5), 467-474.

Cunningham, J. A., Hodgins, D. C., Mackenzie, C. S., Godinho, A., Schell, C., Kushnir, V., & Hendershot, C. S. (2019). Randomized controlled trial of an Internet intervention for problem gambling provided with or without access to an Internet intervention for co-occurring mental health distress. *Internet interventions, 17*, 100239.

Deans, E. G., Thomas, S. L., Derevensky, J., & Daube, M. (2017). The influence of marketing on the sports betting attitudes and consumption behaviours of young men: implications for harm reduction and prevention strategies. *Harm reduction journal, 14*, 1-12.

Derevensky, J. L. (2019). Behavioral addictions: Some developmental considerations. *Current Addiction Reports, 6*, 313-322.

Derevensky, J. L., & Gilbeau, L. (2015). Adolescent gambling: twenty-five years of research. *Canadian Journal of Addiction, 6*(2), 4-12.

Deutscher, K., Gutwinski, S., Bermpohl, F., Bowden-Jones, H., Fazel, S., & Schreiter, S. (2023). The prevalence of problem gambling and gambling disorder among homeless people: A systematic review and meta-analysis. *Journal of Gambling Studies*, *39*(2), 467-482.

Dighton, G., Roberts, E., Hoon, A. E., & Dymond, S. (2018). Gambling problems and the impact of family in UK armed forces veterans. *Journal of behavioral addictions, 7*(2), 355-365.

Dion, J., Cantinotti, M., Ross, A., & Collin-Vézina, D. (2015). Sexual abuse, residential schooling and probable pathological gambling among Indigenous Peoples. *Child abuse & neglect, 44*, 56-65.

Dorey, L., McGarrigle, J., May, R., Hoon, A. E., & Dymond, S. (2022). Client views of contingency management in gambling treatment:

A thematic analysis. *International Journal of Environmental Research and Public Health, 19*(24), 17101.

Dowling, N., Smith, D., & Thomas, T. (2009). The family functioning of female pathological gamblers. *International Journal of Mental Health and Addiction, 7*(1), 29-44.

Dowling, N. A., Cowlishaw, S., Jackson, A. C., Merkouris, S. S., Francis, K. L., & Christensen, D. R. (2015). Prevalence of psychiatric co-morbidity in treatment-seeking problem gamblers: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry, 49*(6), 519-539.

Echeburúa, E., González-Ortega, I., De Corral, P., & Polo-López, R. (2011). Clinical gender differences among adult pathological gamblers seeking treatment. *Journal of gambling studies, 27*(2), 215-227.

Eriksen, J. W., Fiskaali, A., Zachariae, R., Wellnitz, K. B., Oernboel, E., Stenbro, A. W., ... Petersen, M. W. (2023). Psychological intervention for gambling disorder: A systematic review and meta-analysis. *Journal of behavioral addictions, 12*(3), 613-630.

Estevez, A., Herrero-Fernández, D., Sarabia, I., & Jauregui, P. (2015). The impulsivity and sensation-seeking mediators of the psychological consequences of pathological gambling in adolescence. *Journal of gambling studies, 31*(1), 91-103.

Estevez, A., Jauregui, P., Lopez-Gonzalez, H., Mena-Moreno, T., Lozano-Madrid, M., Macia, L., ... Fernandez-Aranda, F. (2021). The severity of gambling and gambling related cognitions as predictors of emotional regulation and coping strategies in adolescents. *Journal of gambling studies, 37*(2), 483-495.

Etuk, R., Shirk, S. D., Grubbs, J., & Kraus, S. W. (2020). Gambling problems in US military veterans. *Current Addiction Reports, 7*(2), 210-228.

Evans, J., & Coventry, K. (2006). A dual-process approach to behavioral addiction: the case of gambling. *Handbook of implicit cognition and addiction*, 29-43.

Faltýnková, A., Blinka, L., Ševčíková, A., & Husarova, D. (2020). The associations between family-related factors and excessive internet use in adolescents. *International Journal of Environmental Research and Public Health, 17*(5), 1754.

Farhat, L. C., Wampler, J., Steinberg, M. A., Krishnan-Sarin, S., Hoff, R. A., & Potenza, M. N. (2021). Excitement-Seeking Gambling in Adolescents: Health Correlates and Gambling-Related Attitudes and Behaviors. *Journal of gambling studies, 37*(1), 43-57.

Fattore, L., Melis, M., Fadda, P., & Fratta, W. (2014). Sex differences in addictive disorders. *Frontiers in neuroendocrinology, 35*(3), 272-284.

Filiz, A. (2015). Purposes, causes and consequences of excessive internet use among Turkish adolescents. *Eurasian Journal of Educational Research, 15*(60), 35-56.

Freeman, J. R., Volberg, R. A., & Zorn, M. (2020). Correlates of at-risk and problem gambling among veterans in Massachusetts. *Journal of gambling studies, 36*(1), 69-83.

Friedman, N. P., & Robbins, T. W. (2022). The role of prefrontal cortex in cognitive control and executive function. *Neuropsychopharmacology, 47*(1), 72-89.

Gallaway, M. S., Fink, D. S., Sampson, L., Cohen, G. H., Tamburrino, M., Liberzon, I., ... Galea, S. (2019). Prevalence and covariates of problematic gambling among a US military cohort. *Addictive behaviors, 95*, 166-171.

Gao, Y.-X., Wang, J.-Y., & Dong, G.-H. (2022). The prevalence and possible risk factors of internet gaming disorder among adolescents and young adults: Systematic reviews and meta-analyses. *Journal of psychiatric research, 154*, 35-43.

Garvey Wilson, A. L., O'Gallagher, K. G., Liu, X., Greenberg, J. G., Otto, J. L., Campbell, M. S., ... Evatt, D. P. (2021). Demographic, Behavioral, and Proximal Risk Factors for Gambling Disorder in the US Military. *The American journal on addictions*.

Gill, K. J., Heath, L. M., Derevensky, J., & Torrie, J. (2016). The social and psychological impacts of gambling in the Cree communities of Northern Quebec. *Journal of gambling studies, 32*(2), 441-457.

González-Ortega, I., Echeburúa, E., Corral, P., Polo-López, R., & Alberich, S. (2013). Predic-

tors of pathological gambling severity taking gender differences into account. *European Addiction Research, 19*(3), 146-154.
Grady, J., Kitzinger, R., & Quisenberry, W. (2024). SMART Recovery 4-Point Program's Congruency With Evidence-Based Counseling Approaches: An Assessment. In *Multisector Insights in Healthcare, Social Sciences, Society, and Technology* (pp. 270-294): IGI Global.
Granero, R., Fernández-Aranda, F., Mestre-Bach, G., Steward, T., García-Caro, B., Prever, F., ... Aymamí, N. (2018). Clustering of treatment-seeking women with gambling disorder. *Journal of behavioral addictions, 7*(3), 770-780.
Grant, J. E., Chamberlain, S. R., Schreiber, L. R., & Odlaug, B. L. (2012). Gender-related clinical and neurocognitive differences in individuals seeking treatment for pathological gambling. *Journal of psychiatric research, 46*(9), 1206-1211.
Grant, J. E., Lust, K., Christenson, G. A., Redden, S. A., & Chamberlain, S. R. (2019). Gambling and its clinical correlates in university students. *International journal of psychiatry in clinical practice, 23*(1), 33-39.
Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to behavioral addictions. *The American journal of drug and alcohol abuse, 36*(5), 233-241.
Gyollai, Á., D Griffiths, M., Barta, C., Vereczkei, A., Urbán, R., Kun, B., ... Blum, K. (2014). The genetics of problem and pathological gambling: a systematic review. *Current pharmaceutical design, 20*(25), 3993-3999.
Hagen, B., Kalishuk, R. G., Currie, C., Solowoniuk, J., & Nixon, G. (2013). A big hole with the wind blowing through it: Aboriginal women's experiences of trauma and problem gambling. *International Gambling Studies, 13*(3), 356-370.
Hahmann, T., Hamilton-Wright, S., Ziegler, C., & Matheson, F. I. (2020). Problem gambling within the context of poverty: a scoping review. *International Gambling Studies*, 1-37.
Hamilton-Wright, S., Woodhall-Melnik, J., Guilcher, S. J., Schuler, A., Wendaferew, A., Hwang, S. W., & Matheson, F. I. (2016). Gambling in the landscape of adversity in youth: reflections from men who live with poverty and homelessness. *International Journal of Environmental Research and Public Health, 13*(9), 854.
Hammond, C. J., Mayes, L. C., & Potenza, M. N. (2014). Neurobiology of adolescent substance use and addictive behaviors: prevention and treatment implications. *Adolescent medicine: State of the art reviews, 25*(1), 15.
Harris, T., Kintzle, S., Wenzel, S., & Castro, C. A. (2017). Expanding the understanding of risk behavior associated with homelessness among veterans. *Military medicine, 182*(9-10), e1900-e1907.
Haushofer, J., & Fehr, E. (2014). On the psychology of poverty. *science, 344*(6186), 862-867.
Hawker, C. O., Merkouris, S. S., Youssef, G. J., & Dowling, N. A. (2021). A smartphone-delivered ecological momentary intervention for problem gambling (GamblingLess: Curb Your Urge): Single-arm acceptability and feasibility trial. *Journal of Medical Internet Research, 23*(3), e25786.
Hayer, T., & Griffiths, M. D. (2015). Gambling. In *Handbook of Adolescent Behavioral Problems* (pp. 539-558): Springer.
Heron, K. E., & Smyth, J. M. (2010). Ecological momentary interventions: incorporating mobile technology into psychosocial and health behaviour treatments. *British journal of health psychology, 15*(1), 1-39.
Hing, N., & Breen, H. (2014). Indigenous Australians and gambling.
Hing, N., Breen, H., Gordon, A., & Russell, A. (2014a). Gambling among indigenous men and problem gambling risk factors: An Australian study. *International Journal of Mental Health and Addiction, 12*(4), 491-508.
Hing, N., Breen, H., Gordon, A., & Russell, A. (2014b). Gambling behaviour and gambling risk factors for Indigenous Australian women. *International Journal of Mental Health and Addiction, 12*(1), 1-20.
Hing, N., Breen, H., Gordon, A., & Russell, A. (2014c). Gambling harms and gambling help-seeking amongst Indigenous Australians. *Journal of gambling studies, 30*(3), 737-755.
Hing, N., Breen, H., Gordon, A., & Russell, A. (2014d). Risk factors for problem gambling among indigenous Australians: an empiri-

cal study. *Journal of gambling studies, 30*(2), 387-402.
Hing, N., Russell, A., Tolchard, B., & Nower, L. (2016). Risk factors for gambling problems: An analysis by gender. *Journal of gambling studies, 32*(2), 511-534.
Hitch, C., Leightley, D., Murphy, D., & Dymond, S. ACT Vet: A mixed-methods pilot study of efficacy, usability and cost-effectiveness of an Acceptance and Commitment Therapy (ACT) based app for veterans with harmful gambling and PTSD.
Hitch, C., Leightley, D., Murphy, D., Trompeter, N., & Dymond, S. (2023). Acceptance and commitment therapy for co-occurring gambling disorder and posttraumatic stress disorder in veterans: a narrative review. *European journal of psychotraumatology, 14*(1), 2178203.
Hodgins, D. C., & Holub, A. (2015). Components of impulsivity in gambling disorder. *International Journal of Mental Health and Addiction, 13*(6), 699-711.
Horvath, A. T., & Yeterian, J. (2016). SMART recovery: Self-empowering, science-based addiction recovery support. In *Broadening the Base of Addiction Mutual Support Groups* (pp. 27-42): Routledge.
Humphreys, K. (2003). Circles of recovery: Self-help organizations for addictions.
ICD-11, W. H. O. International classification of disease, ICD-11, 2020.
Ioannidis, K., Del Giovane, C., Tzagarakis, C., Solly, J. E., Westwood, S. J., Parlatini, V., Bowden-Jones, H., Grant, J. E., Cortese, S., Chamberlain, S. J. (2024). Pharmacological management of gambling disorder: A systematic review and network meta-analysis. *Comprehensive Psychiatry, 137,* 152566.
Jauregui, P., Onaindia, J., & Estévez, A. (2017). Adaptive and maladaptive coping strategies in adult pathological gamblers and their mediating role with anxious-depressive symptomatology. *Journal of gambling studies, 33*(4), 1081-1097.
Kaminer, Y. (2010). Problematic use of energy drinks by adolescents. *Child and Adolescent Psychiatric Clinics, 19*(3), 643-650.
Kauer, J. A., & Malenka, R. C. (2007). Synaptic plasticity and addiction. *Nature reviews neuroscience, 8*(11), 844-858.
Kavanagh, D. J., Andrade, J., & May, J. (2005). Imaginary relish and exquisite torture: the elaborated intrusion theory of desire. *Psychological review, 112*(2), 446.
Kessler, R. C., Hwang, I., LaBrie, R., Petukhova, M., Sampson, N. A., Winters, K. C., & Shaffer, H. J. (2008). DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological medicine, 38*(9), 1351-1360.
Keyes, K. M., Martins, S. S., Blanco, C., & Hasin, D. S. (2010). Telescoping and gender differences in alcohol dependence: new evidence from two national surveys. *American Journal of Psychiatry, 167*(8), 969-976.
Khazaal, Y., Monney, G., Richter, F., & Achab, S. (2017). «Jeu-contrôle», rationnel d'une application de soutien aux limites de jeux. *Journal de thérapie comportementale et cognitive, 27*(3), 129-137.
Kolandai-Matchett, K., Langham, E., Bellringer, M., & Siitia, P. A.-H. (2017). How gambling harms experienced by Pacific people in New Zealand amplify when they are culture-related. *Asian Journal of Gambling Issues and Public Health, 7*(1), 1-20.
Kong, G., Smith, P. H., Pilver, C., Hoff, R., & Potenza, M. N. (2016). Problem-gambling severity and psychiatric disorders among American-Indian/Alaska native adults. *Journal of psychiatric research, 74*, 55-62.
Koob, G. F., & Le Moal, M. (2004). Drug addiction and allostasis. *Allostasis, homeostasis, and the costs of physiological adaptation, 11*(3), 150-163.
Kraus, S. W., Etuk, R., & Potenza, M. N. (2020). Current pharmacotherapy for gambling disorder: a systematic review. *Expert opinion on pharmacotherapy, 21*(3), 287-296.
Kryszajtys, D. T., Hahmann, T. E., Schuler, A., Hamilton-Wright, S., Ziegler, C. P., & Matheson, F. I. (2018). Problem gambling and delinquent behaviours among adolescents: a scoping review. *Journal of gambling studies, 34*(3), 893-914.

LaBrie, R. A., Peller, A. J., LaPlante, D. A., Bernhard, B., Harper, A., Schrier, T., & Shaffer, H. J. (2012). A brief self-help toolkit intervention for gambling problems: A randomized multisite trial. *American Journal of Orthopsychiatry, 82*(2), 278.

Lang, M., Leménager, T., Streit, F., Fauth-Bühler, M., Frank, J., Juraeva, D., ... Heilmann-Heimbach, S. (2016). Genome-wide association study of pathological gambling. *European psychiatry, 36*, 38-46.

Lee, M.-S., Potenza, M. N., & Bhang, S.-Y. (2025) Applying the Interaction of Person-Affect-Cognition-Execution (I-PACE) Model to Addictive Behaviors in East Asian Countries: Feasibility and Considerations. *Journal of the Korean Academy of Child and Adolescent Psychiatry 36*(3),144–151.

Leeman, R. F., Hoff, R. A., Krishnan-Sarin, S., Patock-Peckham, J. A., & Potenza, M. N. (2014). Impulsivity, sensation-seeking, and part-time job status in relation to substance use and gambling in adolescents. *Journal of Adolescent Health, 54*(4), 460-466.

Leppink, E. W., Odlaug, B. L., Lust, K., Christenson, G., & Grant, J. E. (2016). The young and the stressed: Stress, impulse control, and health in college students. *The Journal of nervous and mental disease, 204*(12), 931-938.

Lin, E.-Y. J., Casswell, S., Huckle, T., You, R. Q., & Asiasiga, L. (2011). Does one shoe fit all? Impacts of gambling among four ethnic groups in New Zealand. *Journal of Gambling Issues*(26), 69-88.

Lind, K., Salonen, A. H., Järvinen-Tassopoulos, J., Alho, H., & Castrén, S. (2019). Problem gambling and support preferences among Finnish prisoners: a pilot study in an adult correctional population. *International journal of prisoner health*.

Lind, P. A., Zhu, G., Montgomery, G. W., Madden, P. A., Heath, A. C., Martin, N. G., & Slutske, W. S. (2013). Genome-wide association study of a quantitative disordered gambling trait. *Addiction biology, 18*(3), 511-522.

Linehan, M. M. (2020). *Dialectical behavior therapy in clinical practice: Applications across disorders and settings*: Guilford Publications.

Lobo, D. S. (2016). Genetic aspects of gambling disorders: recent developments and future directions. *Current behavioral neuroscience reports, 3*, 58-66.

Loo Gee, B., Griffiths, K. M., & Gulliver, A. (2016). Effectiveness of mobile technologies delivering Ecological Momentary Interventions for stress and anxiety: a systematic review. *Journal of the American Medical Informatics Association, 23*(1), 221-229.

Luquiens, A., Tanguy, M.-L., Lagadec, M., Benyamina, A., Aubin, H.-J., & Reynaud, M. (2016). The efficacy of three modalities of Internet-based psychotherapy for non–treatment-seeking online problem gamblers: a randomized controlled trial. *Journal of Medical Internet Research, 18*(2), e4752.

Makri-Botsari, E., & Karagianni, G. (2014). Cyberbullying in Greek adolescents: The role of parents. *Procedia-Social and Behavioral Sciences, 116*, 3241-3253.

Malak, M. Z., Khalifeh, A. H., & Shuhaiber, A. H. (2017). Prevalence of Internet Addiction and associated risk factors in Jordanian school students. *Computers in Human Behavior, 70*, 556-563.

Mameli, M., & Lüscher, C. (2011). Synaptic plasticity and addiction: learning mechanisms gone awry. *Neuropharmacology, 61*(7), 1052-1059.

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *science, 341*(6149), 976-980.

Marks, K. R., & Clark, C. D. (2018). The telescoping phenomenon: Origins in gender bias and implications for contemporary scientific inquiry. *Substance Use & Misuse, 53*(6), 901-909.

Martínez-Loredo, V., Grande-Gosende, A., Fernández-Artamendi, S., Secades-Villa, R., & Fernández-Hermida, J. R. (2019). Substance use and gambling patterns among adolescents: differences according to gender and impulsivity. *Journal of gambling studies, 35*(1), 63-78.

Matheson, F. I., Devotta, K., Wendaferew, A., & Pedersen, C. (2014). Prevalence of gambling problems among the clients of a Toronto

homeless shelter. *Journal of gambling studies, 30*(2), 537-546.
McCurdy, L. Y., Loya, J. M., Hart-Derrick, V. R., Young, G. C., Kiluk, B. D., & Potenza, M. N. (2023). Smartphone apps for problem gambling: a review of content and quality. *Current Addiction Reports, 10*(2), 178-186.
McEvoy, A., & Spirgen, N. (2012). Gambling among prison inmates: Patterns and implications. *Journal of gambling studies, 28*(1), 69-76.
McGarrigle, J., Dorey, L., Christensen, D., May, R., Hoon, A. E., & Dymond, S. (2024). ConGam-PS: developing and evaluating a measurement tool of treatment providers' views about contingency management for gambling. *Addiction Research & Theory, 32*(4), 245-254.
McIntosh, C., O'Neill, K., & Fennessy, K. (2017). Dialectical Behaviour Therapy and Pathological Gambling. *Evidence-Based Treatments for Problem Gambling*, 73-83.
McIntosh, C., O'Neill, K., & McIntosh, C. (2017). Acceptance and Commitment Therapy ("ACT") for Problem Gambling. *Evidence-Based Treatments for Problem Gambling*, 63-71.
Merkouris, S. S., Hawker, C. O., Rodda, S. N., Youssef, G. J., & Dowling, N. A. (2020). GamblingLess: Curb Your Urge: Development and usability testing of a smartphone-delivered ecological momentary intervention for problem gambling. *International Gambling Studies, 20*(3), 515-538.
Merkouris, S. S., Thomas, A. C., Shandley, K. A., Rodda, S. N., Oldenhof, E., & Dowling, N. A. (2016). An update on gender differences in the characteristics associated with problem gambling: A systematic review. *Current Addiction Reports, 3*(3), 254-267.
Miller, W. R., & Rollnick, S. (2012). *Motivational interviewing: Helping people change*: Guilford press.
Mills, D. J., Marchica, L., Keough, M. T., & Derevensky, J. L. (2020). Exploring differences in substance use among emerging adults at-risk for problem gambling, and/or problem video gaming. *International Gambling Studies, 20*(3), 539-555.
Mishra, S., Beshai, S., Wuth, A., & Refaie, N. (2019). Risk and protective factors in problem gambling: an examination of psychological resilience. *International Gambling Studies, 19*(2), 241-264.
Montiel, I., Ortega-Barón, J., Basterra-González, A., González-Cabrera, J., & Machimbarrena, J. M. (2021). Problematic online gambling among adolescents: A systematic review about prevalence and related measurement issues. *Journal of behavioral addictions, 10*(3), 566-586.
Morrison, L. (2017). Nga Pou Wahine: Gambling misuse and Ma¯ ori women in New Zealand. In *Gambling Disorders in Women* (pp. 268-278): Routledge.
Murphy IV, C. E., Wang, R. C., Montoy, J. C., Whittaker, E., & Raven, M. (2022). Effect of extended-release naltrexone on alcohol consumption: a systematic review and meta-analysis. *Addiction, 117*(2), 271-281.
Nordmyr, J., Forsman, A. K., Wahlbeck, K., Björkqvist, K., & Österman, K. (2014). Associations between problem gambling, socio-demographics, mental health factors and gambling type: Sex differences among Finnish gamblers. *International Gambling Studies, 14*(1), 39-52.
Nower, L., Eyrich-Garg, K. M., Pollio, D. E., & North, C. S. (2015). Problem gambling and homelessness: Results from an epidemiologic study. *Journal of gambling studies, 31*(2), 533-545.
Olason, D. T., Kristjansdottir, E., Einarsdottir, H., Haraldsson, H., Bjarnason, G., & Derevensky, J. L. (2011). Internet gambling and problem gambling among 13 to 18 year old adolescents in Iceland. *International Journal of Mental Health and Addiction, 9*, 257-263.
Olson-Madden, J. H., Forster, J. E., Huggins, J., & Schneider, A. (2012). Psychiatric diagnoses, mental health utilization, high-risk behaviors, and self-directed violence among veterans with comorbid history of traumatic brain injury and substance use disorders. *The Journal of head trauma rehabilitation, 27*(5), 370-378.
Paterson, M., Whitty, M., & Leslie, P. (2021). Exploring the prevalence of gambling harm

among active duty military personnel: a systematic scoping review. *Journal of gambling studies, 37*(2), 529-549.
Patterson, D. A., Welte, J. W., Barnes, G. M., Tidwell, M.-C. O., & Spicer, P. (2015). Sociocultural Influences on Gambling and Alcohol Use Among Native Americans in the United States. *Journal of gambling studies/co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming, 31*(4), 1387.
Pattinson, J., & Parke, A. (2017). The experience of high-frequency gambling behavior of older adult females in the United Kingdom: an interpretative phenomenological analysis. *Journal of Women & Aging, 29*(3), 243-253.
Peeters, M., Oldehinkel, T., & Vollebergh, W. (2017). Behavioral control and reward sensitivity in adolescents' risk taking behavior: A longitudinal TRAILS study. *Frontiers in psychology, 8*, 231.
Petry, N. M., Ginley, M. K., & Rash, C. J. (2017). A systematic review of treatments for problem gambling. *Psychology of Addictive Behaviors, 31*(8), 951.
Petry, N. M., Stinson, F. S., & Grant, B. F. (2005). Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of clinical psychiatry, 66*(5), 564-574.
Pilver, C. E., Libby, D. J., Hoff, R. A., & Potenza, M. N. (2013). Gender differences in the relationship between gambling problems and the incidence of substance-use disorders in a nationally representative population sample. *Drug and alcohol dependence, 133*(1), 204-211.
Piquet-Pessoa, M., & Fontenelle, L. F. (2016). Opioid antagonists in broadly defined behavioral addictions: a narrative review. *Expert opinion on pharmacotherapy, 17*(6), 835-844.
Pirrone, D., van den Eijnden, R. J., & Peeters, M. (2024). Why we can't stop: The impact of rewarding elements in videogames on adolescents' problematic gaming behavior. *Media Psychology, 27*(3), 379-400.
Potenza, M. N., Balodis, I. M., Derevensky, J., Grant, J. E., Petry, N. M., Verdejo-Garcia, A., & Yip, S. W. (2019). Gambling disorder. *Nature reviews Disease primers, 5*(1), 1-21.
Richard, K., Baghurst, T., Faragher, J. M., & Stotts, E. (2017). Practical treatments considering the role of sociocultural factors on problem gambling. *Journal of gambling studies, 33*(1), 265-281.
Riley, B., & Oakes, J. (2015). Problem gambling among a group of male prisoners: Lifetime prevalence and association with incarceration. *Australian & New Zealand Journal of Criminology, 48*(1), 73-81.
Riley, B. J., Larsen, A., Battersby, M., & Harvey, P. (2018). Problem gambling among Australian male prisoners: lifetime prevalence, help-seeking, and association with incarceration and aboriginality. *International journal of offender therapy and comparative criminology, 62*(11), 3447-3459.
Roberts, A., Sharman, S., Coid, J., Murphy, R., Bowden-Jones, H., Cowlishaw, S., & Landon, J. (2017). Gambling and negative life events in a nationally representative sample of UK men. *Addictive behaviors, 75*, 95-102.
Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: an incentive-sensitization theory of addiction. *Brain research reviews, 18*(3), 247-291.
Robinson, T. E., & Berridge, K. C. (2008). The incentive sensitization theory of addiction: some current issues. *Philosophical Transactions of the Royal Society B: Biological Sciences, 363*(1507), 3137-3146.
Robinson, T. E., & Berridge, K. C. (2025). The Incentive-Sensitization Theory of Addiction 30 Years On. *Annual review of psychology, 76*.
Rolvien, L., Buddeberg, L., Gehlenborg, J., Borsutzky, S., & Moritz, S. (2024). A Self-Guided Internet-Based Intervention for the Reduction of Gambling Symptoms: A Randomized Clinical Trial. *JAMA network open, 7*(6), e2417282-e2417282.
Ronzitti, S., Lutri, V., Smith, N., Clerici, M., & Bowden-Jones, H. (2016). Gender differences in treatment-seeking British pathological gamblers. *Journal of behavioral addictions, 5*(2), 231-238.

Russell, A. M., Browne, M., Hing, N., Visintin, T., Begg, S., Rawat, V., & Rockloff, M. (2021). Stressful life events precede gambling problems, and continued gambling problems exacerbate stressful life events; a life course calendar study. *Journal of gambling studies*, 1-26.

Saldanha, K., & Madangopal, D. (2019). The social dimensions of gambling among street youth in Mumbai: Is it really an addiction? *Qualitative Social Work, 18*(2), 265-285.

Salmela-Aro, K., Upadyaya, K., Hakkarainen, K., Lonka, K., & Alho, K. (2017). The dark side of internet use: Two longitudinal studies of excessive internet use, depressive symptoms, school burnout and engagement among Finnish early and late adolescents. *Journal of youth and Adolescence, 46*(2), 343-357.

Sancho, M., De Gracia, M., Rodriguez, R. C., Mallorquí-Bagué, N., Sánchez-González, J., Trujols, J., ... Menchon, J. M. (2018). Mindfulness-based interventions for the treatment of substance and behavioral addictions: a systematic review. *Frontiers in psychiatry*, 95.

Sharman, S. (2019). Gambling and Homelessness: Prevalence and Pathways. *Current Addiction Reports, 6*(2), 57-64.

Sharman, S., Dreyer, J., Aitken, M., Clark, L., & Bowden-Jones, H. (2015). Rates of problematic gambling in a British homeless sample: a preliminary study. *Journal of gambling studies, 31*(2), 525-532.

Sharman, S., Dreyer, J., Clark, L., & Bowden-Jones, H. (2016). Down and out in London: Addictive behaviors in homelessness. *Journal of behavioral addictions, 5*(2), 318-324.

Sharman, S., Dreyer, J., Clark, L., & Bowden-Jones, H. (2016). Homelessness and gambling: a complex relationship.

Shead, N. W., Derevensky, J. L., & Gupta, R. (2010). Risk and protective factors associated with youth problem gambling. *International journal of adolescent medicine and health, 22*(1), 39.

Shirk, S. D., Kelly, M. M., Kraus, S. W., Potenza, M. N., Pugh, K., Waltrous, C., ... Drebing, C. E. (2018). Gambling-related cognitive distortions predict level of function among US veterans seeking treatment for gambling disorders. *The American journal on addictions, 27*(2), 108-115.

Soto, C., West, A. E., Ramos, G. G., & Unger, J. B. (2022). Substance and behavioral addictions among American Indian and Alaska native populations. *International Journal of Environmental Research and Public Health, 19*(5), 2974.

Spångberg, J., & Svensson, J. (2020). Associations Between Youth Unemployment and Underage Gambling in Europe. *Journal of Gambling Issues, 45*.

Stefanovics, E. A., & Potenza, M. N. (2022). Update on gambling disorder. *Psychiatric Clinics of North America, 45*(3), 483-502.

Stefanovics, E. A., Potenza, M. N., & Pietrzak, R. H. (2017a). Gambling in a national US veteran population: Prevalence, socio-demographics, and psychiatric comorbidities. *Journal of gambling studies, 33*, 1099-1120.

Stefanovics, E. A., Potenza, M. N., & Pietrzak, R. H. (2017b). Gambling in a national US veteran population: Prevalence, socio-demographics, and psychiatric comorbidities. *Journal of gambling studies, 33*(4), 1099-1120.

Stefanovics, E. A., Zhai, Z. W., & Potenza, M. N. (2023). Gambling in Connecticut Adolescents: Prevalence, Socio-demographic Characteristics, Trauma Exposure, Suicidality, and Other Risk Behaviors. *medRxiv*, 2023.2008. 2011.23294008.

Stevens, M., & Bailie, R. (2012). Gambling, housing conditions, community contexts and child health in remote indigenous communities in the Northern Territory, Australia. *BMC Public Health, 12*(1), 1-13.

Stevens, M., & Young, M. (2010). Independent correlates of reported gambling problems amongst Indigenous Australians. *Social Indicators Research, 98*(1), 147-166.

Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry, 55*(6), 553-568.

Strom, T. Q., Leskela, J., James, L. M., Thuras, P. D., Voller, E., Weigel, R., ... Holz, K. B. (2012). An exploratory examination of risk-taking

behavior and PTSD symptom severity in a veteran sample. *Military medicine, 177*(4), 390-396.

Studer, J., Baggio, S., Mohler-Kuo, M., Simon, O., Daeppen, J.-B., & Gmel, G. (2016). Latent class analysis of gambling activities in a sample of young Swiss men: Association with gambling problems, substance use outcomes, personality traits and coping strategies. *Journal of gambling studies, 32*(2), 421-440.

Svensson, J., & Romild, U. (2014). Problem gambling features and gendered gambling domains amongst regular gamblers in a Swedish population-based study. *Sex Roles, 70*(5-6), 240-254.

Syed, Y. Y., & Keating, G. M. (2013). Extended-release intramuscular naltrexone (VIVITROL®): a review of its use in the prevention of relapse to opioid dependence in detoxified patients. *CNS drugs, 27*(10), 851-861.

Tackett, J. L., Krieger, H., Neighbors, C., Rinker, D., Rodriguez, L., & Edward, G. (2017). Comorbidity of alcohol and gambling problems in emerging adults: A bifactor model conceptualization. *Journal of gambling studies, 33*(1), 131-147.

Tang, K. T., Kim, H. S., Hodgins, D. C., McGrath, D. S., & Tavares, H. (2020). Gambling disorder and comorbid behavioral addictions: Demographic, clinical, and personality correlates. *Psychiatry research, 284*, 112763.

Thomsen, C. J., Stander, V. A., McWhorter, S. K., Rabenhorst, M. M., & Milner, J. S. (2011). Effects of combat deployment on risky and self-destructive behavior among active duty military personnel. *Journal of psychiatric research, 45*(10), 1321-1331.

Tse, S., Dyall, L., Clarke, D., Abbott, M., Townsend, S., & Kingi, P. (2012). Why people gamble: A qualitative study of four New Zealand ethnic groups. *International Journal of Mental Health and Addiction, 10*(6), 849-861.

Tulloch, C., Browne, M., Hing, N., & Rockloff, M. (2020). The Relationship Between Family Gambling Problems, Other Family Stressors, and Health Indicators in a Large Population-Representative Sample of Australian Adults. *Journal of gambling studies*, 1-24.

van der Maas, M., & Nower, L. (2021). Gambling and military Service: Characteristics, comorbidity, and problem severity in an epidemiological sample. *Addictive behaviors, 114*, 106725.

Vandenberg, B., Livingstone, C., Carter, A., & O'Brien, K. (2021). Gambling and homelessness in older adults: A qualitative investigation. *Addiction*.

Walker, S. E., Abbott, M. W., & Gray, R. J. (2012). Knowledge, views and experiences of gambling and gambling-related harms in different ethnic and socio-economic groups in New Zealand. *Australian and New Zealand Journal of Public Health, 36*(2), 153-159.

Wang, C., Cunningham-Erdogdu, P., Steers, M. L. N., Weinstein, A. P., & Neighbors, C. (2020). Stressful life events and gambling: The roles of coping and impulsivity among college students. *Addictive Behaviors, 107*, 106386.

Wegmann, E., Antons, S., Schmidt, L. D., Klein, L., Montag, C., Rumpf, H.-J., ... Brand, M. (2025). Feels good, and less bad: Problematic use of the Internet is associated with heightened experiences of both gratification and compensation. *Journal of behavioral addictions*.

Weintraub, D., Koester, J., Potenza, M. N., Siderowf, A. D., Stacy, M., Voon, V., ... Lang, A. E. (2010). Impulse control disorders in Parkinson disease: a cross-sectional study of 3090 patients. *Archives of neurology, 67*(5), 589-595.

Westermeyer, J., Canive, J., Garrard, J., Thuras, P., & Thompson, J. (2005). Lifetime prevalence of pathological gambling among American Indian and Hispanic American veterans. *American journal of public health, 95*(5), 860-866.

Westermeyer, J., Canive, J., Thuras, P., Oakes, M., & Spring, M. (2013). Pathological and problem gambling among veterans in clinical care: Prevalence, demography, and clinical correlates. *The American journal on addictions, 22*(3), 218-225.

Whiting, S. W., Potenza, M. N., Park, C. L., McKee, S. A., Mazure, C. M., & Hoff, R. A. (2016). Investigating veterans' pre-, peri-, and post-deployment experiences as potential risk factors for problem gambling. *Journal of behavioral addictions, 5*(2), 213-220.

Williams, R. J., Belanger, Y. D., Leonard, C. A., Stevens, R. M., Christensen, D. R., El-Guebaly, N., ... McGrath, D. S. (2021). Indigenous Gambling and Problem Gambling in Canada. *Journal of gambling studies*, 1-19.

Williams, R. J., Belanger, Y. D., & Prusak, S. Y. (2016). Gambling and problem gambling among Canadian urban Aboriginals. *The Canadian Journal of Psychiatry, 61*(11), 724-731.

Williams, R. J., Royston, J., & Hagen, B. F. (2005). Gambling and problem gambling within forensic populations: A review of the literature. *Criminal Justice and Behavior, 32*(6), 665-689.

Williams, R. J., Stevens, R. M., & Nixon, G. (2011). Gambling and problem gambling in North American Aboriginal people. In: University of Manitoba Press.

Winters, K. C., & Arria, A. (2011). Adolescent brain development and drugs. *The prevention researcher, 18*(2), 21.

Wise, R. A. (2004). Dopamine, learning and motivation. *Nature reviews neuroscience, 5*(6), 483-494.

Wolf, D. A. P. S., Welte, J. W., Barnes, G. M., Tidwell, M.-C. O., & Spicer, P. (2015). Sociocultural influences on gambling and alcohol use among Native Americans in the United States. *Journal of gambling studies, 31*(4), 1387-1404.

Woodhall-Melnik, J., Hamilton-Wright, S., Guilcher, S. J., Wendaferew, A., Schuler, A., & Matheson, F. I. (2019). Reflections on poverty, Homelessness and problem gambling: Discoveries from a world cafe. *Journal of Gambling Issues, 42*.

Xuan, Y.-H., Li, S., Tao, R., Chen, J., Rao, L.-L., Wang, X., & Zheng, R. (2017). Genetic and environmental influences on gambling: A meta-analysis of twin studies. *Frontiers in psychology, 8*, 2121.

Yakovenko, I., Quigley, L., Hemmelgarn, B. R., Hodgins, D. C., & Ronksley, P. (2015). The efficacy of motivational interviewing for disordered gambling: systematic review and meta-analysis. *Addictive behaviors, 43*, 72-82.

Young, M., Stevens, M., & Morris, M. (2008). Problem gambling within the non-Indigenous population of the Northern Territory of Australia: A multivariate analysis of risk factors. *International Gambling Studies, 8*(1), 77-93.

Zakiniaeiz, Y., Cosgrove, K. P., Mazure, C. M., & Potenza, M. N. (2017). Does telescoping exist in male and female gamblers? Does it matter? *Frontiers in psychology, 8*, 1510.

4

EPIDEMIOLOGY OF BEHAVIOURAL ADDICTIONS

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ABSTRACT:

In recent years, there has been a substantial increase in epidemiological studies focusing on behavioural addictions, shedding light on their prevalence, underlying risk factors, and potential impact on individuals and society. This chapter attempts to elucidate key facets of the epidemiology of behavioural addictions based on the most recent scientific evidence, including prevalence, risk and protective factors, potential consequences for health and life, and interventions aimed at improving health-related outcomes for people with behavioural addictions. Limitations of current research and future directions are also discussed. Overall, epidemiological research contributes to our understanding of behavioural addictions and informs efforts to prevent and treat them.

KEYWORDS:

behavioural addictions, gaming disorder, gambling disorder, epidemiology

1. INTRODUCTION

Non-substance addictive behaviours (hereafter referred to as 'behavioural addictions' for brevity) are increasingly recognised as a major public health concern worldwide due to their potential to cause harm to individuals (Dong & Potenza, 2014; Stein et al., 2018). In recent years, there has been a remarkable increase in epidemiological research on these conditions. This chapter aims to explore key aspects of the epidemiology of behavioural addictions, drawing on the latest scientific evidence. It examines their prevalence, identifies risk and protective factors, highlights the potential health and social consequences, and discusses interventions designed to improve health outcomes for those affected.

2. ADDICTIVE BEHAVIOURS AT FOCUS

Currently, only two behavioural addictions —gambling and gaming disorders— are formally recognised in the International Classification of Diseases, 11th revision (ICD-11) (WHO, 2024). In the DSM-5-TR (APA, 2022) only gambling disorder is recognized as a mental condition, while Internet Gaming Disorder is still considered as a condition for further study (Section 3 of the manual). In addition to these two conditions, this chapter examines other emerging behavioural addictions: shopping, pornography use, and social network use. Although these behaviours are not formally classified as distinct addictive disorders in diagnostic manuals, they are generally considered as conditions characterised by an inability to control excessive engagement, leading to psychological distress, dysfunction, and disruption of daily life (Brand et al., 2020). The terms gambling/gaming disorder is used as they concern recognized conditions. For other emerging behavioural addictions, the term problematic use/behaviour is preferred.

This chapter does not address Internet or smartphone addiction. Internet and smartphone indeed constitute mediums (or delivery mechanisms) through which

individuals engage in specific online activities (e.g., online gambling or shopping, porn consumption) that can become addictive, rather than genuine addictive behaviours as such (Sim et al., 2012; Starcevic, 2013; Starcevic & Billieux, 2017). Recent research indicates that viewing smartphone or Internet addiction as single conditions is overly simplistic. Instead, these behaviours represent a range of distinct disorders that share some common risk factors whilst also having their own unique characteristics (Baggio et al., 2022; Baggio et al., 2018). This spectrum of conditions, though related, requires specific approaches for understanding and treatment.

3. PREVALENCE OF BEHAVIOURAL ADDICTIONS

The first epidemiological step is to determine the extent of the problem and estimate how many people are affected. To date, gambling disorder remains the only addictive behaviour that can be reliably assessed using a validated diagnostic tool. It is worth noting that diagnostic tools are currently being developed for gaming disorder under a WHO-led project (Carragher et al., 2022). Estimating the prevalence of other addictive behaviours is therefore challenging, as assessments are often based on a variety of instruments that may use inconsistent definitions, different criteria, and sometimes lack robust psychometric properties (Rumpf et al., 2019). The figures presented in Table 1 should therefore be interpreted as preliminary estimates aimed at understanding the potential scale of the problem.

Table 1. *Prevalence estimates of non-substance addictive behaviours*

Behavioural addiction	Reference	No. of studies	Sample size	No. of countries	Prevalence (95% confidence interval)[1]
Recognized					
Gambling	Tran et al. (2024)	380	3,441,720	68	1.4% (1.1%; 1.8%)
Gaming	Kim et al. (2022)	71	227,665	29	2.4% (1.7%; 3.2%)
"Candidates"					
Shopping	Maraz et al. (2016)	5	10,102	4	4.9% (3.4%; 6.9%)
Pornography	Böthe et al. (2024)	1	82,243	42	3.2% (3.0%; 3.3%)
Social network	Cheng et al. (2021)	10	5,695	5	5% (2%; 8%)

1 Where available, prevalence in representative samples or adjusted for publication bias is reported.

Gambling disorder is the most studied behavioural addiction, with 380 studies included in the latest meta-analysis (Tran et al., 2024). In this study, an estimated prevalence of 1.4% among adults was found based on representative studies. Prevalence estimates for adolescents were not provided due to insufficient data, but adolescent risky gambling ranged between 2.7% and 27.8%.

For gaming disorder, the second most studied addictive behaviour, Kim et al. (2022) reported a prevalence of 2.4% based on representative samples, including adolescents. Their broader analysis, which included all available studies, found a higher pooled prevalence of 3.3% (95% CI: 2.6%; 4.0%). In another recent meta-analysis focusing on Internet gaming disorder among adolescents, Gao et al. (2022) estimated a prevalence of 8.8% (95% CI: 6.5%; 9.6%), adjusting for study quality. It is worth noting that most studies included in this meta-analysis used DSM criteria, which are less conservative than ICD-11 criteria and at-risk to promote over-diagnosis (see e.g., Castro-Calvo et al., 2021; Nogueira-Lopez et al., 2023).

There is less evidence for emerging behavioural addictions. Maraz et al. (2016) examined problematic shopping behaviour and found a meta-analytic prevalence of 4.9% in four representative adult samples. The prevalence was notably higher in university students (8.3%, 95% CI: 5.9%; 11.5%), non-representative adult samples (12.3%, 95% CI: 7.6%; 19.1%), and shopping-specific samples (16.2%, 95% CI: 8.8%; 27.8%).

Regarding problematic pornography use, no meta-analysis is available. Böthe et al. (2024) reported an overall prevalence of 3.2% across 42 countries, with estimates ranging from 1.0% to 16.7%. However, this study did not employ a probabilistic sampling strategy, limiting the generalisability of the findings.

For problematic social network use, Cheng et al. (2021) presented a prevalence estimate of 5% based on ten studies using the stricter monothetic classification, which requires endorsement of all symptoms. Using the more lenient polythetic approach, which requires endorsement of two-thirds of symptoms, the prevalence was significantly higher at 24% (95% CI: 18%; 31%). The prevalence was 35% (95% CI: 27%; 43%) in adolescent samples. Notably, prevalence estimates were unavailable for representative samples.

All studies report substantial heterogeneity in prevalence estimates for behavioural addictions. This variability may be due to differences in the screening tools used (Stevens et al., 2021) or reliance on non-representative sampling strategies (Bőthe, Nagy, et al., 2024; Cheng et al., 2021; Stevens et al., 2021).

These prevalence rates indicate that behavioural addictions affect a substantial proportion of the population, highlighting the fact that they constitute a major public health problem. The prevalence of these behaviours suggests that they are not isolated phenomena, but rather widespread challenges that require the attention of public health systems and policy makers. This seems especially true for adolescents, who have higher prevalence estimates. This suggests a potential increased vulnerability at this period of biological, behavioural, and psychological changes.

4. RISK AND PROTECTIVE FACTORS FOR BEHAVIOURAL ADDICTIONS

Addictive behaviours are common, but we need to understand who is at risk of developing them. Risk and protective factors for substance use and addictive disorders

arise from a complex interplay of genetic, psychological (e.g., underlying mental health conditions), social (e.g., peer influence) and environmental (e.g., accessibility of addictive activities) influences. Based on available evidence in the context of behavioural addictions, distinguishing factors that contribute to their development from those that arise as a consequence of them remains challenging.

This section draws on recent meta-analytic evidence to identify the most salient potential risk and protective factors for behavioural addictions (Allami et al., 2021; Dowling et al., 2017; Ropovik et al., 2023; Zhuang et al., 2023). The analysis focuses on three specific behaviours: gambling disorder, gaming disorder, and problematic pornography use, as these are supported by robust meta-analytic findings and are the only ones than can be linked to conditions officially recognized in ICD-11 (Billieux et al., 2024; Reed et al., 2022). To be more precise, problematic pornography is not recognized as such, but it is related to the compulsive sexual behaviour disorder included in ICD-11 (Kraus et al., 2018; Reed et al., 2022). Other emerging behavioural addictions, although potentially relevant from a public health perspective, require further research to establish a convincing level of evidence.

Table 2 summarises the main risk and protective factors identified in previous meta-analyses of gambling and gaming disorders (Allami et al., 2021; Dowling et al., 2017; Ropovik et al., 2023; Zhuang et al., 2023), as well as findings from a large-scale study of problematic pornography use (Bőthe, Nagy, et al., 2024). Despite the diversity of behavioural addictions, there are common aetiologies in risk and protective factors. These commonalities are often rooted in psychological, social, and neurobiological factors that underlie maladaptive behaviours. Here, we present some key shared risk factors. Factors are included if they showed at least a small effect size ($r \geq .10$) in at least two meta-analyses.

Table 2. *Main risk and protective factors of addictive behaviours*

Risk factors	Protective factors
Socio-demographic factors	
Male gender	High level of education
Social/familial factors	
Loneliness	High level of parental supervision
Peer antisocial behaviour	
Psychological factors	
Depression	Self-control
Anxiety	Self-esteem
Impulsivity	Life satisfaction
Substance use	
ADHD	
Hostility/aggressiveness	
Emotional avoidance motive	
Patterns of use	
Frequency of use	

ADHD: Attention deficit hyperactivity disorder.

The findings presented in Table 2 highlight the multidimensional nature of the risk and protective factors associated with behavioural addictions. Across the three behaviours examined, being male consistently emerged as a relevant risk factor. Social vulnerabilities, such as loneliness and antisocial peer behaviour, also play a crucial role in promoting addictive behaviour. Loneliness was also identified as a potential risk factor in a systematic review without meta-analysis focusing on problematic social network use (O'Day & Heimberg, 2021).

These meta-analyses identified a wide range of psychological vulnerabilities, including anxiety, attention-deficit hyperactivity disorder, depression (consistently associated with behavioural addictions), hostility or aggressiveness, impulsivity, and substance use and abuse. These factors increase the risk of developing behavioural addictions, consistent with established evidence linking mental health problems to maladaptive coping mechanisms. Some maladaptive coping strategies, such as emotional avoidance, were formally identified in two meta-analyses (Bőthe, Vaillancourt-Morel, et al., 2024; Ropovik et al., 2023). Emotional dysregulation has also been identified as an important risk factor for behavioural addictions (González-Roz et al., 2024; Velotti et al., 2021). In addition, frequency of use of these activities may reinforce behavioural addictions. Specifically for gambling disorder, gambling formats that allow continuous play (e.g., electronic gaming machines, Internet gambling) have been described as one of the biggest risk factors (Allami et al., 2021). In fact, design features of apps supporting online behaviours promote dysregulated and prolonged use (Flayelle et al., 2023).

In contrast, protective factors mitigate these risks and reduce the likelihood of developing behavioural addictions. High levels of education and parental supervision promote structured environments that limit exposure to high-risk contexts. Psychological strengths such as elevated self-control, self-esteem, and life satisfaction contribute to resilience and help individuals to cope with triggers that could lead to behavioural addictions.

These findings also applied to adolescent populations, with some of these studies focusing on early risk and protective factors or young populations (Dowling et al., 2017; Zhuang et al., 2023). In addition, engaging in the behaviour at an early age is likely to be associated with an increased risk of developing a behavioural addiction (Shead et al., 2010). Bullying is another important potential risk factor of behavioural addictions in adolescents (Gao et al., 2022).

Comorbid mental health conditions are commonly observed in people with behavioural addictions (Starcevic & Khazaal, 2017). These comorbidities may share overlapping risk factors or exacerbate the severity of addictive patterns. However, the directionality of these relationships —whether mental health disorders predispose individuals to addiction or whether addiction contributes to the development of mental health problems— remains poorly understood. This understanding could also inform more integrated policy, prevention, and treatment approaches.

5. CONSEQUENCES OF ADDICTIVE BEHAVIOURS

Addictive behaviours have been shown to have a wide range of negative effects on individuals, with evidence linking these behaviours to outcomes in physical, psychological, and social domains. This section explores what are the effects of addictive behaviours. It is important to recognize that intensive involvement in activities such as gaming, gambling, or online sexual activities is not necessarily problematic nor associated with adverse consequences and functional impairment (Billieux et al., 2019; Kardefelt-Winther et al., 2017; Király et al., 2017). In this regard, intensive involvement in these activities must be distinguished from problematic involvement to reduce the risk of overpathologisation (Flayelle et al., 2022). However, this chapter focuses on addiction, thus the benefits of activities such as gaming, gambling, or online sexual activities are not considered.

Physically, engagement in behavioural addictions can lead to sedentary lifestyles and associated health risks. For example, prolonged gaming has been associated with musculoskeletal problems (Tholl et al., 2022), eye strain (Mylona et al., 2020), and sleep disturbance (Kristensen et al., 2021). Children and adolescents are particularly vulnerable to these health problems, which can have long-lasting consequences, experiencing musculoskeletal problems (Sarıkaya et al., 2023), eye strain (Chidi-Egboka et al., 2023; Chu et al., 2023), headaches (Langdon et al., 2024), and disrupted sleep patterns (Hale & Guan, 2015). In addition, there is growing empirical evidence of a link between behavioural addictions and cardiovascular disease; for example, gambling disorder has been associated with cardiovascular problems (Abdul Rahim et al., 2023). Cardiovascular complications have also been documented in adolescents, with cases of thromboembolism associated with prolonged video game use (Kohorst et al., 2018). This association may be due to the increased risk of obesity (Marker, 2022), which is also seen in adolescents (Che Mokhtar & McGee, 2025). Although the physical consequences are often indirect and require further research to clarify causal pathways, they contribute to the overall health burden of those affected.

The psychological correlates of behavioural addictions are well documented in both adults and adolescents, with studies identifying associations with depression, anxiety, other mental health conditions, and substance use (Allami et al., 2021; Bőthe, Vaillancourt-Morel, et al., 2024; Dowling et al., 2017; Männikkö et al., 2020; Ropovik et al., 2023; Zhuang et al., 2023). However, the relationship between mental health and behavioural addictions is often reciprocal (Krossbakken et al., 2018), meaning that mental health conditions can also lead to an increased risk of behavioural addictions.

Social consequences are also pervasive and are used as criteria for the diagnosis of behavioural addictions. Excessive engagement in these behaviours can lead to neglect of real-world relationships, fostering social isolation, interpersonal conflict, and negative effects on family members (Riley et al., 2021; Suomi et al., 2022; Yang et al., 2024). In academic and professional contexts, behavioural addictions can disrupt performance and productivity. For example, gaming and social network use have been associated

with poorer academic outcomes in children, adolescents, and students (Alzahrani & Griffiths, 2024; Astatke et al., 2023; Gentile, 2009). Overall, the detrimental effects of behavioural addictions highlight the need for early intervention and targeted prevention strategies designed to mitigate harm.

6. INTERVENTIONS

Behavioural addictions represent a major public health challenge, requiring comprehensive efforts in prevention, education and treatment (Stein et al., 2018). One of the main barriers to addressing these conditions is the considerable heterogeneity among individuals, who can vary widely in the nature and severity of their behaviours, underlying risk factors and comorbid conditions (Eriksen et al., 2023). This section reviews the latest research on evidence-based interventions to identity how we can help people with behavioural addictions.

6.1 Interventions targeting treatment

Psychological interventions are the most widely used approaches for the treatment of behavioural addictions (Eriksen et al., 2023). Among these, cognitive behavioural therapy (CBT) has emerged as a particularly effective option, with medium effect sizes across a range of behavioural addictions. Meta-analytic evidence highlights the success of CBT in reducing symptom severity in gaming and gambling disorders, while also alleviating comorbid conditions such as depression and anxiety (Eriksen et al., 2023; Stevens et al., 2019). Notably, CBT remains the most extensively studied intervention in the field, reflecting its established efficacy and versatility in addressing the complex interplay of symptoms associated with addictive behaviours. These findings also apply to adolescent populations (Lampropoulou et al., 2022).

Other psychological interventions, including motivational interventions, Internet-based interventions, group counselling, family therapy, craving interventions, and mindfulness-based therapy, have also been shown to be effective in treating behavioural addictions, as will be seen in some of the following chapters of the handbook. Evidence from randomised controlled trials suggests that these approaches achieve small to medium effect sizes (Boonen et al., 2024; Chen et al., 2023; Eriksen et al., 2023; Nielsen et al., 2021; Parisi et al., 2022; Yakovenko et al., 2015). Both face-to-face and remotely delivered interventions have shown positive effects; however, face-to-face interventions generally show greater efficacy (Eriksen et al., 2023), likely due to stronger therapeutic alliance. Remotely delivered interventions are a promising area of research, as they may extend access to treatment to those who are unable to attend face-to-face therapy (Boumparis et al., 2022; Sagoe et al., 2021).

The evidence on long-term benefits of psychological interventions for behavioural addictions suggests that therapeutic gains often diminish without sustained follow-up,

highlighting the need for further research into maintaining long-term efficacy (Yakovenko et al., 2015).

For behaviours such as problematic pornography use and problematic shopping behaviour, psychological interventions, particularly CBT, have shown potential to reduce symptom severity (Goslar et al., 2020; Vasiliu, 2022).

6.2 Interventions targeting prevention

In contrast to the relatively well-studied treatment strategies for behavioural addictions (with the exception of emerging conditions), prevention strategies remain a significantly under-researched area (Grande-Gosende et al., 2020; King et al., 2018; McMahon et al., 2019). The current evidence base is particularly sparse for harm-reduction-focused prevention methods (McMahon et al., 2019). Existing prevention initiatives often draw on general substance use and addiction frameworks, incorporating elements such as educational campaigns (e.g., universal school-based interventions), skill-building programmes, and behaviour modification techniques. Interventions focusing on health also included components related to screen time, with positive results (Champion et al., 2019). These approaches have shown promise in reducing risk factors and promoting resilience (Grande-Gosende et al., 2020; King et al., 2018; McMahon et al., 2019).

7. FUTURE DIRECTIONS AND CONCLUSIONS

The field of behavioural addictions has made important progress in recent years, but many critical gaps remain. Future research must prioritise the development and validation of diagnostic instruments tailored to emerging behavioural addictions, that will be essential to provide accurate prevalence estimates. Another critical direction is the investigation of causal pathways and mechanisms underlying these disorders. Indeed, one of the main challenges in studying risk and protective factors of behavioural addictions is the difficulty in establishing causal relationships between risk/protective factors and the development of behavioural addictions. Much of the existing evidence comes from observational studies, which can establish associations but not causality. Longitudinal and experimental studies are needed to disentangle the complex interplay between risk and protective factors and the development of these conditions. This includes addressing the bidirectional relationships between mental health and behavioural addictions. Such efforts can guide the development of targeted interventions tailored to specific populations and contexts. From a clinical perspective, there is an urgent need to evaluate the long-term effectiveness of treatment and to develop empirically-based prevention strategies (Eriksen et al., 2023; King et al., 2017; Stevens et al., 2019). Long-term follow-up studies are essential to identify factors that contribute to sustained therapeutic benefit and to develop maintenance-oriented interventions.

Overall, epidemiological research helps to understand how many people are affected by behavioural addictions, how the people are, what the consequences are, and how the problem can be addressed. Building on robust epidemiological research, future efforts can better inform public health initiatives, improve clinical outcomes, and ultimately improve the health of those affected by behavioural addictions.

REFERENCES

Abdul Rahim, Y., Fernandez-Aranda, F., Jimenez-Murcia, S., & Håkansson, A. (2023). A nationwide case–control study on cardiovascular and respiratory-related disorders in patients with gambling disorder in Sweden. *Public Health*, *224*, 45-50. https://doi.org/10.1016/j.puhe.2023.08.018

Allami, Y., Hodgins, D. C., Young, M., Brunelle, N., Currie, S., Dufour, M., Flores-Pajot, M.-C., & Nadeau, L. (2021). A meta-analysis of problem gambling risk factors in the general adult population. *Addiction*, *116*(11), 2968-2977. https://doi.org/10.1111/add.15449

Alzahrani, A. K. D., & Griffiths, M. D. (2024). Problematic gaming and students' academic performance: A systematic review. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-024-01338-5

APA. (2022). *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR)*, Washington DC, USA. https://doi/book/10.1176/appi.books.9780890425787

Astatke, M., Weng, C., & Chen, S. (2023). A literature review of the effects of social networking sites on secondary school students' academic achievement. *Interactive Learning Environments*, *31*(4), 2153-2169. https://doi.org/10.1080/10494820.2021.1875002

Baggio, S., Starcevic, V., Billieux, J., King, D. L., Gainsbury, S. M., Eslick, G. D., & Berle, D. (2022). Testing the spectrum hypothesis of problematic online behaviors: A network analysis approach. *Addictive Behaviors*, *135*, 107451. https://doi.org/10.1016/j.addbeh.2022.107451

Baggio, S., Starcevic, V., Studer, J., Simon, O., Gainsbury, S. M., Gmel, G., & Billieux, J. (2018). Technology-mediated addictive behaviors constitute a spectrum of related yet distinct conditions: A network perspective. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, *32*(5), 564-572. https://doi.org/10.1037/adb0000379

Billieux, J., Fineberg, N. A., King, D. L., & Rumpf, H.-J. (2024). Disorders due to addictive behaviors and impulse control disorders. In *A psychological approach to diagnosis: Using the ICD-11 as a framework* (pp. 289-309). American Psychological Association. https://psycnet.apa.org/record/2024-66764-016

Billieux, J., Flayelle, M., Rumpf, H.-J., & Stein, D. J. (2019). High involvement versus pathological involvement in video games: a crucial distinction for ensuring the validity and utility of gaming disorder. *Current Addiction Reports*, *6*(3), 323-330. https://doi.org/10.1007/s40429-019-00259-x

Boonen, H., Vanderplasschen, W., Sinclair, D. L., Flayelle, M., & Billieux, J. (2024). Group-based interventions for adolescents with gaming disorder or problematic gaming behavior: A systematic review. *Current Addiction Reports*, *11*(3), 551-564. https://doi.org/10.1007/s40429-024-00570-2

Bőthe, B., Nagy, L., Koós, M., Demetrovics, Z., Potenza, M. N., Consortium, I. S. S., & Kraus, S. W. (2024). Problematic pornography use across countries, genders, and sexual orientations: Insights from the International Sex Survey and comparison of different assessment tools. *Addiction*, *119*(5), 928-950. https://doi.org/10.1111/add.16431

Bőthe, B., Vaillancourt-Morel, M.-P., Bergeron, S., Hermann, Z., Ivaskevics, K., Kraus, S. W., & Grubbs, J. B. (2024). Uncovering the most robust predictors of problematic pornography use: A large-scale machine learning study across 16 countries. *Journal of Psychopathology and Clinical Science*, *133*(6), 489-502. https://doi.org/10.1037/abn0000913

Boumparis, N., Haug, S., Abend, S., Billieux, J., Riper, H., & Schaub, M. P. (2022). Internet-based interventions for behavioral addictions: A systematic review. *Journal of Behavioral Addictions*, *11*(3), 620-642. https://doi.org/10.1556/2006.2022.00054

Brand, M., Rumpf, H.-J., Demetrovics, Z., MÜller, A., Stark, R., King, D. L., Goudriaan, A. E., Mann, K., Trotzke, P., Fineberg, N. A., Chamberlain, S. R., Kraus, S. W., Wegmann, E.,

Billieux, J., & Potenza, M. N. (2020). Which conditions should be considered as disorders in the International Classification of Diseases (ICD-11) designation of "other specified disorders due to addictive behaviors"? *Journal of Behavioral Addictions*, *11*(2), 150-159. https://doi.org/10.1556/2006.2020.00035

Carragher, N., Billieux, J., Bowden-Jones, H., Achab, S., Potenza, M. N., Rumpf, H.-J., Long, J., Demetrovics, Z., Gentile, D., Hodgins, D., Aricak, O. T., Baigent, M., Gandin, C., Rahimi-Movaghar, A., Scafato, E., Assanangkornchai, S., Siste, K., Hao, W., King, D. L., . . . Poznyak, V. (2022). Brief overview of the WHO Collaborative Project on the Development of New International Screening and Diagnostic Instruments for Gaming Disorder and Gambling Disorder. *Addiction*, *117*(7), 2119-2121. https://doi.org/10.1111/add.15780

Champion, K. E., Parmenter, B., McGowan, C., Spring, B., Wafford, Q. E., Gardner, L. A., Thornton, L., McBride, N., Barrett, E. L., Teesson, M., Newton, N. C., & Health4Life, t. (2019). Effectiveness of school-based eHealth interventions to prevent multiple lifestyle risk behaviours among adolescents: a systematic review and meta-analysis. *The Lancet. Digital Health*, *1*(5), e206-e221. https://doi.org/10.1016/S2589-7500(19)30088-3

Che Mokhtar, M., & McGee, R. (2025). Impact of internet addiction and gaming disorder on body weight in children and adolescents: A systematic review. *Journal of Paediatrics and Child Health*, 61(2), 136-147. https://doi.org/10.1111/jpc.16726

Chen, Y., Lu, J., Wang, L., & Gao, X. (2023). Effective interventions for gaming disorder: A systematic review of randomized control trials. *Frontiers in Psychiatry*, *14*. https://doi.org/10.3389/fpsyt.2023.1098922

Cheng, C., Lau, Y.-c., Chan, L., & Luk, J. W. (2021). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. *Addictive Behaviors*, *117*, 106845. https://doi.org/10.1016/j.addbeh.2021.106845

Chidi-Egboka, N. C., Jalbert, I., & Golebiowski, B. (2023). Smartphone gaming induces dry eye symptoms and reduces blinking in school-aged children. *Eye*, *37*(7), 1342-1349. https://doi.org/10.1038/s41433-022-02122-2

Chu, G. C. H., Chan, L. Y. L., Do, C.-w., Tse, A. C. Y., Cheung, T., Szeto, G. P. Y., So, B. C. L., Lee, R. L. T., & Lee, P. H. (2023). Association between time spent on smartphones and digital eye strain: A 1-year prospective observational study among Hong Kong children and adolescents. *Environmental Science and Pollution Research*, *30*(20), 58428-58435. https://doi.org/10.1007/s11356-023-26258-0

Dong, G., & Potenza, M. N. (2014). A cognitive-behavioral model of Internet gaming disorder: theoretical underpinnings and clinical implications. *Journal of Psychiatric Research*, *58*, 7-11. https://doi.org/10.1016/j.jpsychires.2014.07.005

Dowling, N. A., Merkouris, S. S., Greenwood, C. J., Oldenhof, E., Toumbourou, J. W., & Youssef, G. J. (2017). Early risk and protective factors for problem gambling: A systematic review and meta-analysis of longitudinal studies. *Clinical Psychology Review*, *51*, 109-124. https://doi.org/10.1016/j.cpr.2016.10.008

Eriksen, J. W., Fiskaali, A., Zachariae, R., Wellnitz, K. B., Oernboel, E., Stenbro, A. W., Marcussen, T., & Petersen, M. W. (2023). Psychological intervention for gambling disorder: A systematic review and meta-analysis. *Journal of Behavioral Addictions*, *12*(3), 613-630. https://doi.org/10.1556/2006.2023.00034

Flayelle, M., Brevers, D., King, D. L., Maurage, P., Perales, J. C., & Billieux, J. (2023). A taxonomy of technology design features that promote potentially addictive online behaviours. *Nature Reviews Psychology*, *2*(3), 136-150. https://doi.org/10.1038/s44159-023-00153-4

Flayelle, M., Schimmenti, A., Starcevic, V., & Billieux, J. (2022). The pitfalls of recycling substance-use disorder criteria to diagnose behavioral addictions. In *Evaluating the brain disease model of addiction*. London, UK: Routledge. https://doi.org/10.4324/9781003032762

Gao, Y.-X., Wang, J.-Y., & Dong, G.-H. (2022). The prevalence and possible risk factors of internet gaming disorder among adolescents and young adults: Systematic reviews

and meta-analyses. *Journal of Psychiatric Research*, *154*, 35-43. https://doi.org/10.1016/j.jpsychires.2022.06.049

Gentile, D. (2009). Pathological video-game use among youth ages 8 to 18: A national study. *Psychological Science*, *20*(5), 594-602. https://doi.org/10.1111/j.1467-9280.2009.02340.x

González-Roz, A., Castaño, Y., Krotter, A., Salazar-Cedillo, A., & Gervilla, E. (2024). Emotional dysregulation in relation to substance use and behavioral addictions: Findings from five separate meta-analyses. *International Journal of Clinical and Health Psychology*, *24*(3), 100502. https://doi.org/10.1016/j.ijchp.2024.100502

Goslar, M., Leibetseder, M., Muench, H. M., Hofmann, S. G., & Laireiter, A.-R. (2020). Treatments for internet addiction, sex addiction and compulsive buying: A meta-analysis. *Journal of Behavioral Addictions*, *9*(1), 14-43. https://doi.org/10.1556/2006.2020.00005

Grande-Gosende, A., López-Núñez, C., García-Fernández, G., Derevensky, J., & Fernández-Hermida, J. R. (2020). Systematic review of preventive programs for reducing problem gambling behaviors among young adults. *Journal of Gambling Studies*, *36*(1), 1-22. https://doi.org/10.1007/s10899-019-09866-9

Hale, L., & Guan, S. (2015). Screen time and sleep among school-aged children and adolescents: A systematic literature review. *Sleep Medicine Reviews*, *21*, 50-58. https://doi.org/10.1016/j.smrv.2014.07.007

Kardefelt-Winther, D., Heeren, A., Schimmenti, A., van Rooij, A., Maurage, P., Carras, M., Edman, J., Blaszczynski, A., Khazaal, Y., & Billieux, J. (2017). How can we conceptualize behavioural addiction without pathologizing common behaviours? *Addiction*, *112*(10), 1709-1715. https://doi.org/10.1111/add.13763

Kim, H. S., Son, G., Roh, E.-B., Ahn, W.-Y., Kim, J., Shin, S.-H., Chey, J., & Choi, K.-H. (2022). Prevalence of gaming disorder: A meta-analysis. *Addictive Behaviors*, *126*, 107183. https://doi.org/10.1016/j.addbeh.2021.107183

King, D. L., Delfabbro, P. H., Doh, Y. Y., Wu, A. M. S., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2018). Policy and prevention approaches for disordered and hazardous gaming and Internet use: an international perspective. *Prevention Science*, *19*(2), 233-249. https://doi.org/10.1007/s11121-017-0813-1

King, D. L., Delfabbro, P. H., Wu, A. M. S., Doh, Y. Y., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2017). Treatment of Internet gaming disorder: An international systematic review and CONSORT evaluation. *Clinical Psychology Review*, *54*, 123-133. https://doi.org/10.1016/j.cpr.2017.04.002

Király, O., Tóth, D., Urbán, R., Demetrovics, Z., & Maraz, A. (2017). Intense video gaming is not essentially problematic. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, *31*(7), 807-817. https://doi.org/10.1037/adb0000316

Kohorst, M. A., Warad, D. M., Nageswara Rao, A. A., & Rodriguez, V. (2018). Obesity, sedentary lifestyle, and video games: the new thrombophilia cocktail in adolescents. *Pediatric blood & cancer*, *65*(7), e27041. https://doi.org/10.1002/pbc.27041

Kraus, S. W., Krueger, R. B., Briken, P., First, M. B., Stein, D. J., Kaplan, M. S., Voon, V., Abdo, C. H. N., Grant, J. E., Atalla, E., & Reed, G. M. (2018). Compulsive sexual behaviour disorder in the ICD-11. *World Psychiatry*, *17*(1), 109-110. https://doi.org/10.1002/wps.20499

Kristensen, J. H., Pallesen, S., King, D. L., Hysing, M., & Erevik, E. K. (2021). Problematic gaming and sleep: A systematic review and meta-analysis. *Frontiers in Psychiatry*, *12*, 675237. https://doi.org/10.3389/fpsyt.2021.675237

Krossbakken, E., Pallesen, S., Mentzoni, R. A., King, D. L., Molde, H., Finserås, T. R., & Torsheim, T. (2018). A cross-lagged study of developmental trajectories of video game engagement, addiction, and mental health. *Frontiers in Psychology*, *9*, 2239. https://doi.org/10.3389/fpsyg.2018.02239

Lampropoulou, P., Siomos, K., Floros, G., & Christodoulou, N. (2022). Effectiveness of available treatments for gaming disorders in children and adolescents: A systematic review. *Cyberpsychology, Behavior and Social Net-*

working, *25*(1), 5-13. https://doi.org/10.1089/cyber.2021.0067

Langdon, R. L., DiSabella, M. T., & Strelzik, J. A. (2024). Screen time and pediatric headache: A scoping review of the literature. *Headache: The Journal of Head and Face Pain*, *64*(2), 211-225. https://doi.org/10.1111/head.14674

Männikkö, N., Ruotsalainen, H., Miettunen, J., Pontes, H. M., & Kääriäinen, M. (2020). Problematic gaming behaviour and health-related outcomes: A systematic review and meta-analysis. *Journal of Health Psychology*, *25*(1), 67-81. https://doi.org/10.1177/1359105317740414

Maraz, A., Griffiths, M. D., & Demetrovics, Z. (2016). The prevalence of compulsive buying: a meta-analysis. *Addiction (Abingdon, England)*, *111*(3), 408-419. https://doi.org/10.1111/add.13223

McMahon, N., Thomson, K., Kaner, E., & Bambra, C. (2019). Effects of prevention and harm reduction interventions on gambling behaviours and gambling related harm: An umbrella review. *Addictive Behaviors*, *90*, 380-388. https://doi.org/10.1016/j.addbeh.2018.11.048

Mylona, I., Deres, E. S., Dere, G.-D. S., Tsinopoulos, I., & Glynatsis, M. (2020). The Impact of Internet and Videogaming Addiction on Adolescent Vision: A Review of the Literature. *Frontiers in Public Health*, *8*, 63. https://doi.org/10.3389/fpubh.2020.00063

Nielsen, P., Christensen, M., Henderson, C., Liddle, H. A., Croquette-Krokar, M., Favez, N., & Rigter, H. (2021). Multidimensional family therapy reduces problematic gaming in adolescents: A randomised controlled trial. *Journal of Behavioral Addictions*, *10*(2), 234-243. https://doi.org/10.1556/2006.2021.00022

O'Day, E. B., & Heimberg, R. G. (2021). Social media use, social anxiety, and loneliness: A systematic review. *Computers in Human Behavior Reports*, *3*, 100070. https://doi.org/10.1016/j.chbr.2021.100070

Parisi, A., Roberts, R. L., Hanley, A. W., & Garland, E. L. (2022). Mindfulness-oriented recovery enhancement for addictive behavior, psychiatric distress, and chronic pain: A multilevel meta-analysis of randomized controlled trials. *Mindfulness*, *13*(10), 2396-2412. https://doi.org/10.1007/s12671-022-01964-x

Reed, G. M., First, M. B., Billieux, J., Cloitre, M., Briken, P., Achab, S., Brewin, C. R., King, D. L., Kraus, S. W., & Bryant, R. A. (2022). Emerging experience with selected new categories in the ICD-11: complex PTSD, prolonged grief disorder, gaming disorder, and compulsive sexual behaviour disorder. *World Psychiatry*, *21*(2), 189-213. https://doi.org/10.1002/wps.20960

Riley, B. J., Harvey, P., Crisp, B. R., Battersby, M., & Lawn, S. (2021). Gambling-related harm as reported by concerned significant others: a systematic review and meta-synthesis of empirical studies. *Journal of Family Studies*, *27*(1), 112-130. https://doi.org/10.1080/13229400.2018.1513856

Ropovik, I., Martončik, M., Babinčák, P., Baník, G., Vargová, L., & Adamkovič, M. (2023). Risk and protective factors for (internet) gaming disorder: A meta-analysis of pre-COVID studies. *Addictive Behaviors*, *139*, 107590. https://doi.org/10.1016/j.addbeh.2022.107590

Rumpf, H.-J., Brandt, D., Demetrovics, Z., Billieux, J., Carragher, N., Brand, M., Bowden-Jones, H., Rahimi-Movaghar, A., Assanangkornchai, S., Glavak-Tkalic, R., Borges, G., Lee, H.-K., Rehbein, F., Fineberg, N. A., Mann, K., Potenza, M. N., Stein, D. J., Higuchi, S., King, D., . . . Poznyak, V. (2019). Epidemiological challenges in the study of behavioral addictions: a call for high standard methodologies. *Current Addiction Reports*, *6*(3), 331-337. https://doi.org/10.1007/s40429-019-00262-2

Sagoe, D., Griffiths, M. D., Erevik, E. K., Høyland, T., Leino, T., Lande, I. A., Sigurdsson, M. E., & Pallesen, S. (2021). Internet-based treatment of gambling problems: A systematic review and meta-analysis of randomized controlled trials. *Journal of Behavioral Addictions*, *10*(3), 546-565. https://doi.org/10.1556/2006.2021.00062

Sarıkaya, M., Avcı, P., Satılmış, N., Kılınçarslan, G., Bayraktar, I., & Bayrakdar, A. (2023). The effect of digital gaming duration on musculoskeletal system symptoms: A systematic study. *International Journal of Disabilities Sports*

and Health Sciences, *6*(3), 564-573. https://doi.org/10.33438/ijdshs.1332626

Shead, N. W., Derevensky, J. L., & Gupta, R. (2010). Risk and protective factors associated with youth problem gambling. *International Journal of Adolescent Medicine and Health*, *22*(1), 39-58. http://www.ncbi.nlm.nih.gov/pubmed/20491417

Sim, T., Gentile, D. A., Bricolo, F., Serpelloni, G., & Gulamoydeen, F. (2012). A conceptual review of research on the pathological use of computers, video games, and the Internet. *International Journal of Mental Health and Addiction*, *10*(5), 748-769. https://doi.org/10.1007/s11469-011-9369-7

Starcevic, V. (2013). Is Internet addiction a useful concept? *The Australian and New Zealand Journal of Psychiatry*, *47*(1), 16-19. https://doi.org/10.1177/0004867412461693

Starcevic, V., & Billieux, J. (2017). Does the construct of Internet addiction reflect a single entity or a spectrum of disorders? *Clinical Neuropsychiatry: Journal of Treatment Evaluation*, *14*(1), 5-10. https://psycnet.apa.org/record/2017-10293-002

Starcevic, V., & Khazaal, Y. (2017). Relationships between behavioural addictions and psychiatric disorders: What is known and what is yet to be learned? *Frontiers in Psychiatry*, *8*, 53. https://doi.org/10.3389/fpsyt.2017.00053

Stein, D. J., Billieux, J., Bowden-Jones, H., Grant, J. E., Fineberg, N., Higuchi, S., Hao, W., Mann, K., Matsunaga, H., Potenza, M. N., Rumpf, H.-J. M., Veale, D., Ray, R., Saunders, J. B., Reed, G. M., & Poznyak, V. (2018). Balancing validity, utility and public health considerations in disorders due to addictive behaviours. *World Psychiatry*, *17*(3), 363-364. https://doi.org/10.1002/wps.20570

Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *The Australian and New Zealand Journal of Psychiatry*, *55*(6), 553-568. https://doi.org/10.1177/0004867420962851

Stevens, M. W. R., King, D. L., Dorstyn, D., & Delfabbro, P. H. (2019). Cognitive–behavioral therapy for Internet gaming disorder: A systematic review and meta-analysis. *Clinical Psychology & Psychotherapy*, *26*(2), 191-203. https://doi.org/10.1002/cpp.2341

Suomi, A., Lucas, N., Dowling, N., & Delfabbro, P. (2022). Parental problem gambling and child wellbeing: Systematic review and synthesis of evidence. *Addictive Behaviors*, *126*, 107205. https://doi.org/10.1016/j.addbeh.2021.107205

Tholl, C., Bickmann, P., Wechsler, K., Froböse, I., & Grieben, C. (2022). Musculoskeletal disorders in video gamers – a systematic review. *BMC Musculoskeletal Disorders*, *23*(1), 678. https://doi.org/10.1186/s12891-022-05614-0

Vasiliu, O. (2022). Therapeutic management of buying/shopping disorder: A systematic literature review and evidence-based recommendations. *Frontiers in Psychiatry*, *13*, 1047280. https://doi.org/10.3389/fpsyt.2022.1047280

Velotti, P., Rogier, G., Beomonte Zobel, S., & Billieux, J. (2021). Association between gambling disorder and emotion (dys)regulation: A systematic review and meta-analysis. *Clinical Psychology Review*, *87*, 102037. https://doi.org/10.1016/j.cpr.2021.102037

WHO. (2024). *Clinical descriptions and diagnostic requirements for ICD-11 mental, behavioural and neurodevelopmental disorders (CDDR)*. Geneva, Switzerland, World Health Organisation https://iris.who.int/bitstream/handle/10665/375767/9789240077263-eng.pdf

Yakovenko, I., Quigley, L., Hemmelgarn, B. R., Hodgins, D. C., & Ronksley, P. (2015). The efficacy of motivational interviewing for disordered gambling: Systematic review and meta-analysis. *Addictive Behaviors*, *43*, 72-82. https://doi.org/10.1016/j.addbeh.2014.12.011

Yang, X., Liao, T., Wang, Y., Ren, L., & Zeng, J. (2024). The association between digital addiction and interpersonal relationships: A systematic review and meta-analysis. *Clinical Psychology Review*, *114*, 102501. https://doi.org/10.1016/j.cpr.2024.102501

Zhuang, X., Zhang, Y., Tang, X., Ng, T. K., Lin, J., & Yang, X. (2023). Longitudinal modifiable risk and protective factors of internet gaming disorder: A systematic review and meta-analysis. *Journal of Behavioral Addictions*, *12*(2), 375-392. https://doi.org/10.1556/2006.2023.00017

5

WHAT WE KNOW AND WHAT WE STILL NEED TO KNOW ABOUT THEORETICAL MODELS TO EXPLAIN BEHAVIOURAL ADDICTIONS

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ABSTRACT:

Theoretical models on the processes underlying specific mental disorders are relevant for research and clinical practice since they allow to conceptualize and test explicit hypotheses and to develop effective interventions. Multiple theoretical models of behavioural addictions have been developed over the past 20 years with the intention to describe the development and maintenance of behavioural addictions. These theoretical models were mostly inspired by and developed on the basis of theories of substance use disorders. Accordingly, there are a number of common psychological constructs and assumed psychological processes across different theories that are considered important in the context of behavioural addictions, such as the development of cue reactivity and craving or reductions in inhibitory control. Furthermore, some theoretical models link the psychological processes with potential neurobiological correlates known to be involved in substance use disorders, such as craving and desires linked with activities in the ventral and the dorsal striatum and associated circuits. Although empirical evidence supports some of the theories' main assumptions, the models must continue to be empirically tested (against alternative models) and to be revised to more closely reflect the actual processes underlying behavioural addictions.

KEYWORDS:

theories, psychological processes, neurobiological mechanisms, addictive behaviours, craving, self-control

1. INTRODUCTION

Theoretical models on behavioural addictions are commonly inspired by theories on substance use disorders and integrate empirical findings from research on both substance related and non-substance-related addictive behaviours. Since the early 2000s at the latest, theoretical models have been proposed for behavioural addictions that aim to describe the mechanisms of the development and maintenance of behavioural addictions.

The theoretical models are currently being used to inspire the empirical investigations of the mechanisms that may underlie behavioural addictions. In addition, theoretical models of behavioural addictions have already been used to inform treatment protocols and psychoeducation as well as to inspire modern treatment opportunities (e.g., neuromodulation). Accordingly, the aim of theoretical models about the development and maintenance of behavioural addictions should be to explain and integrate predisposing factors, motivations to engage in a specific appetitive behaviour, and subsequent psychological processes (e.g., cue reactivity, craving, implicit/explicit cognitions) that are the basis for the development of symptoms of behavioural addictions (i.e., diminished control, continuation or escalation despite experiences of negative consequences, increasing priority, mental distress/functional impairment; Brand et al., 2020).

Within this chapter, we first summarize the most prominent theoretical models relevant for the understanding of the development and maintenance of behavioural addictions. As most of these models are based on models of substance use disorders, we start with a brief overview of these models, followed by models specifically addressing behavioural addictions. We will focus on the interactions between psychological mechanisms. Furthermore, we will give an update on the status of empirical evidence for specific processes addressing both convergent and divergent model testing.

2. SUMMARY OF MOST INFLUENTIAL AND RECENT MODELS IN RESEARCH ON ADDICTIVE BEHAVIOURS

2.1 Theoretical Models in Research on Substance Use Disorders

One of the most prominent models of substance use disorders, although debated intensively, is the Brain Disease Model of Addiction (BDMA), going back to Leshner (1997). The BDMA argues that addiction is most appropriately understood as a disease of the brain, which is chronic and relapsing (Volkow et al., 2016). The BDMA is based on scientific evidence on biological factors related to addictions (including genetics, but more importantly neurochemical as well as structural and functional brain changes). And in fact, there are multiple studies from different fields demonstrating general and specific brain correlates of addictions, including behavioural addictions (see summary below). The BDMA has received much attention in science and public health, but has also been criticized intensively by multiple scholars (see discussion in Heather et al., 2018). Without going into too much details of this debate, one main concern regarding the interpretation of the BDMA is the question of how deterministic the brain changes related to addictions are for the further individual life of those affected (e.g., intensification of symptoms, recovery). In other words: What is the exact causality between brain changes and addictive behaviours? Interpreting the BDMA as positing that brain abnormalities (and a genetic vulnerability for such brain abnormalities) cause addiction, would not appropriately reflect the BDMA, which in fact also considers addiction as an acquired brain disease (Volkow et al., 2016). Secondly, we know from many fields of neuroscience and psychology that any behaviour has its brain correlates and that the brain has plasticity which means that changes in behaviour can cause changes in the brain and vice versa. Consequently, a more careful understanding of the BDMA may be that addiction is accompanied by brain correlates (without a unidirectional causal relationship) and these brain correlates may be addressed by treatment (e.g., neuromodulation, pharmacological interventions). At the same time, other interventions (e.g., cognitive behavioural therapy) and environmental changes may also result in addiction recovery, which would then also have the respective brain correlates. Future studies may demonstrate evidence for a more strict or liberal interpretation of the BDMA and the potential bidirectional brain-behaviour relationships in the context of addictions.

More specific process-oriented mechanistic models of substance use disorders are related to dual-process approaches (Bechara, 2005; Everitt & Robbins, 2005). These models distinguish between emotion-based/impulsive (urges, desires) and cognition-based/reflective processes (inhibitory control or self-control in a broader sense) that become imbalanced over the course of addiction development. The idea that urges and desires for drug intake become stronger relates to sensitization processes (meaning that the drug becomes increasingly incentifying compared to natural reinforcers), as proposed by the incentive sensitization theory (Berridge & Robinson, 2016; Robinson & Berridge, 1993) and the reward deficiency theory (Blum et al., 2012). The important

role of reduced executive functions and self-control in the addiction process has been stressed by the impaired response inhibition and salience attribution (IRISA) model (Goldstein & Volkow, 2002) and the neurocircuitry model of addiction (Koob & Volkow, 2010; Volkow et al., 2012). The dual-process approach of addictions is complemented by the tripartite model of addiction (Noël et al., 2013) which involves an interoceptive system that may act as a link between impulsive and reflective processes. Additional models focus, for example, on changes of implicit cognition (Wiers & Stacy, 2006) and argue that the addiction process is linked to seemingly automatic cognitive processes, such as attentional biases towards addiction related stimuli, (positive) implicit associations with drug-stimuli and seemingly automatic approach tendencies (see also Breiner et al., 1999). All of the aforementioned theories, although to varying degrees, assume that within the addiction process, the value of the drug increases, which is linked to increasing urges and desires and drug-craving, while cognitive control over the drug intake decreases. Some authors (e.g., Everitt & Robbins, 2005; Everitt & Robbins, 2016) also argue that the drug intake becomes habitual and even compulsive in later stages of addictions. However, the role of habits in human addictive behaviours has been questioned (Hogarth, 2020) and it may be that addictive behaviours relate to stronger stimulus-response behaviours, but not in the conservative interpretation (perception of stimulus results in an automatic response). Instead, stimuli may provoke specific responses, but drug intake may still be guided by specific goals, even though the goals may be activated seemingly automatically by specific stimuli (Hogarth, 2020). The above processes, which may underlie substance use disorders, are discussed in more detail in the next sections in the context of behavioural addictions.

2.2 Theoretical Models in Research on Behavioural Addictions

As outlined in the introduction, well-known examples of theoretical models focusing on specific behavioural addictions are the Pathways model of problem and pathological gambling by Blaszczynski and Nower (2002) and the cognitive-behavioural model of (Internet) gaming disorder by Dong and Potenza (2014). Other influential models take a more general view, with prominent examples being the cognitive-behavioural model of pathological Internet use by Davis (2001), and, more recently, the updated Interaction of Person-Affect-Cognition-Execution (I-PACE) model by Brand and colleagues (2019). The different models should not be seen as competitive concepts, but complement each other and overlap in many respects.

The Pathways model (Blaszczynski & Nower, 2002) is an etiological model of problem gambling that has inspired research and practice on gambling disorder and other behavioural addictions (e.g. Billieux et al., 2015). The model, as well as its updated version (Nower et al., 2022), postulate three pathways through which problematic gambling may develop. In general, interactions between intrapersonal vulnerability factors (e.g., childhood maltreatment, depression, anxiety), ecological factors (e.g., availability and accessibility), personality traits (e.g., impulsivity, anti-social traits), and

specific motivations (e.g., mood modification, stress relief) are assumed which are differently pronounced in the three subtypes. The interactions result in (or are accompanied by) specific conditioning effects and maladaptive cognitions causing irrational beliefs, loss-chasing behaviour and other symptoms of problematic gambling. Pathway 1 ('behaviourally conditioned' subtype) is assumed to develop problem gambling in the absence of predisposing vulnerability factors, but rather mainly due to intensive use and associated conditioning processes. Pathway 2 ('emotionally vulnerable' subtype) is characterized by problematic past (family) experiences, poor coping skills, and the main gambling motivation to escape from negative affective states. Pathway 3 ('antisocial impulsivists' subtype) is characterized by high levels of impulsivity, risk-taking, and antisocial traits and the main gambling motivation to search for meaning and purpose (Nower et al., 2022). The interaction between predisposing vulnerability factors and ecological factors together with mood modification, cognitive distortions/ biases, and specific (further) positive and negative reinforcement processes are also considered central in other process-oriented models.

The cognitive-behavioural model of (Internet) gaming disorder (IGD) by Dong and Potenza (2014) aims to describe the processes involved in the development and maintenance of gaming disorder. Based on models of substance use disorders (see previous section), the model of IGD assumes that interactions between motivational drivers (reward-seeking, stress reduction) and (reduced) cognitive control (response inhibition, executive functions) contribute to engagement in gaming despite negative long-term consequences and thus to the development of IGD symptoms. Consistent with other models, conditioning processes are assumed to reinforce reward-seeking behaviours. In addition, this may further affect executive-control abilities which leads to an increasing imbalance between (heightened) affective/ impulsive and (reduced) cognitive/ reflective processes resulting in IGD. A similar 'vicious cycle' and a central role of cognitive components has been described earlier in the cognitive-behavioural model of pathological internet use (PIU) by Davis (2001). Key components of this model are Internet-related maladaptive cognitions and reinforcement mechanisms (through conditioning processes). The model assumes interactions between psychopathology (e.g., depression, social anxiety), as a necessary element for the development of PIU, and the perception of situational cues leading (through reinforcement learning mechanisms) to maladaptive cognitions that have the potential to cause symptoms of PIU. The model further differentiates between specific forms of PIU (e.g., problematic gaming, problematic pornography use) and more general forms of PIU, characterized by extensive less targeted Internet use related to procrastination and compensation for a lack of real-life social interaction/ support (Davis, 2001). In contrast to other (later) models, diminished impulse control is only mentioned as a symptom of the disorder rather than as a cognitive process in the model.

The recently updated I-PACE model (Brand et al., 2016; 2019) integrates current theories and empirical (neuroscientific) findings on addictive behaviours. It proposes behavioural addictions to result from interactions between predisposing variables (e.g., genetic factors, temperamental features) and specific motives, together with situational factors (e. g., stress) and affective and cognitive responses towards specific triggers. It is assumed that over the course of the addiction, associations between specific affective and cognitive responses to external and internal triggers become stronger (based on reinforcement learning), resulting in seemingly habitual behaviours. In particular, heightened cue reactivity and craving in combination with diminished inhibitory (self-) control are assumed to lead to persistent engagement in the specific behaviour, intensified by the experience of reward and/or relief and respective conditioning processes leading to changes in motivation and implicit cognitions, as well as to cognitive biases. Summarized in a simplified manner, the I-PACE model considers two main driving paths to behavioural addictions (see Brand, 2022): The first is related to positive and negative reinforcement (and the specific behaviour can deliver increasing reward and relief delivery), which can be summarized as 'feels-better path' (and less bad). This part is likely central to early stages of behavioural addictions. Later in the course of addiction, feelings of compulsions ('must-do path') may additionally drive the addictive behaviour. Reduced self-control (reduced "stop-now processes") may be both a vulnerability factor for developing behavioural addictions, but may also decrease in the course of addictive behaviours and may contribute to the maintenance of behavioural addiction (Brand, 2022).

3. SUMMARY OF MOST COMMON CONSTRUCTS AND MECHANISMS

The most common constructs across different theoretical models of behavioural addictions are summarized in Table 1. Regarding common mechanisms (see Table 2), most models assume positive/ negative reinforcement (e.g., feelings of pleasure/gratification during/after performing the behaviour) leading to alterations in specific expectations and cognitive biases with regard to the behaviour. Positive reinforcement and positive expectations towards the behaviour are further assumed to increase affective responses, craving and a motivation to engage in the specific behaviour. Another assumption is that seemingly habitual/ excessive behaviour results from interactions between craving and self-control, namely high cue reactivity and craving accompanied by diminished executive control functions leading to difficulties to inhibit behavioural responses.

Besides theoretical considerations, there is a growing body of empirical findings testing the assumptions about relevant components and mechanisms in the development and maintenance of behavioural addictions.

Table 1. *Summary of most common constructs in theoretical models of behavioural addictions.*

Construct	Description	Theoretical model
Predisposing variables	General vulnerability factors (e.g., genetics, personality, psychopathology) and those specific to certain behaviours (e.g., materialism for buying-shopping disorder).	Pathways model[1] Cognitive-behavioural model of PIU[2] I-PACE model[3]
Environmental/ situational factors	External, situational determinants influencing the acceptance and availability of the offers for behavioural execution (e.g., regulatory legislation, advertising, availability and type of use options).	Pathways model[1] Cognitive-behavioural model of PIU[2] I-PACE model[3]
Cue reactivity & craving	Affective, physiological, and motivational response to the confrontation with addiction associated stimuli/ triggers, leading to a strong urge or desire to perform the behaviour.	Pathways model[1] (Cognitive-behavioural model of PIU[2]) I-PACE model[3] (later stages) Cognitive-behavioural model of IGD[4]
Reduced inhibitory control/ executive functions	Reductions in the ability to control affective, motoric, and/or attention-related impulses leading to difficulties in self-control to resist temptations.	Pathways model[1] ('impulsivity') I-PACE model[3] Cognitive-behavioural model of IGD[4]
Implicit cognitions, attentional biases	Approach tendency, altered implicit associations and cognitions towards the behaviour, increased automated attention allocation to addiction associated stimuli.	I-PACE model[3] (later stages) Cognitive-behavioural model of IGD[4]
Habitual behaviour	Pattern of habitual performance of the behaviour.	Pathways model[1] I-PACE model[3] (later stages)
Specific expectations/ cognitive biases	Conscious expectation of the positive and/ or negative reinforcing effect of performing the behaviour ('maladaptive cognitions') and dysfunctional coping.	Pathways model[1] Cognitive-behavioural model of PIU[2] I-PACE model[3] Cognitive-behavioural model of IGD[4]
Positive reinforcement/ gratification	Experience of gratification through the performance of the behaviour (e.g., joy, excitement, satisfaction while gaming) triggering learning processes that can serve as reinforcers.	Pathways model[1] Cognitive-behavioural model of PIU[2] I-PACE model[3]
Negative reinforcement/ compensation	Compensation of desires or needs that are otherwise not/ not sufficiently fulfilled through the performance of the behaviour (e.g., reduction of stress or negative mood while shopping) triggering learning processes that can serve as reinforcers.	Cognitive-behavioural model of IGD[4] ('reward sensation')

Note. 1 (Blaszczynski & Nower, 2002; Nower et al., 2022), 2(Davis, 2001), 3(Brand et al., 2019), 4(Dong & Potenza, 2014)

Table 2. *Summary of the most central assumed interactions between psychological processes in theoretical models of behavioural addictions.*

Assumed interaction	Description	Theoretical model
Positive reinforcement Cue reactivity & craving	Rewarding, pleasurable experiences may enhance desires and cravings to perform the behaviour through conditioning processes.	Cognitive-behavioural model of PIU[2] I-PACE model[3] Cognitive-behavioural model of IGD[4]
Cue reactivity & craving Reduced inhibitory control/ executive functions Poor control over urges/ excessive behaviour	Heightened desires and urges in combination with poor executive control capacity may lead to difficulties to control the behaviour.	Cognitive-behavioural model of PIU[2] I-PACE model[3] Cognitive-behavioural model of IGD[4]
Positive reinforcement (gratification) Specific expectations/ cognitive biases	Experienced short-term gratifications may reinforce specific expectations, cognitions, and reward-seeking behaviour.	Pathways model[1] Cognitive-behavioural model of PIU[2] I-PACE model[3] Cognitive-behavioural model of IGD[4]

Note. 1(Blaszczynski & Nower, 2002; Nower et al., 2022), 2(Davis, 2001), 3(Brand et al., 2019), 4(Dong & Potenza, 2014)

4. SUMMARY OF EMPIRICAL EVIDENCE FOR THE INVOLVEMENT OF THE MOST COMMON MECHANISMS

The aforementioned theoretical models of behavioural addictions typically distinguish between general (i.e. non-specific) and behavioural-addiction-specific risk factors. For example, traumatic life events and chronic stress are assumed general/ non-specific risk factors for the development of mental disorders including substance use disorders, obsessive-compulsive disorders, anxiety disorders, and behavioural addictions. In contrast, certain motivations or motives for engaging in the specific behaviour (e.g., high sexual trait motivation, high discovery motives) are specific risk factors. These factors may especially explain why individuals develop a specific type of addiction and not another (e.g., gaming disorder but not pornography use disorder). Non-specific risk factors can be biological factors (e.g., genetic predisposition) or previous experiences (e.g., traumatic childhood experiences) that again may relate to epigenetic alterations (De Sa Nogueira et al., 2019). Epigenetic mechanisms involve chromatin modifications possibly elicited due to the use of drugs or other environmental factors (e.g., chronic stress, traumatic events). These modifications alter gene function and thereby for example synaptic plasticity within the reward system without changing the DNA sequence (De Sa Nogueira et al., 2019). While specific research on genetic predispositions in behavioural addictions is scarce, previous works have highlighted the relevance of genetic alterations in substance use disorders

(Maldonado et al., 2021). In addition, associations between traumatic childhood events and the development of behavioural addictions indicate that epigenetic factors may be relevant (Tang et al., 2024). Correlations with (comorbid) psychopathological symptoms (e.g., depression, social anxiety) and specific temperamental features (e.g., impulsivity) have been identified for multiple behavioural addictions (see, for example, Ji et al., 2022, for Internet gaming disorder). However, other temperamental features could be more specific. For example, increased levels of materialism (i.e. a focus on the value of material possessions and wealth) may be specific for buying-shopping disorder (Müller et al., 2014; Wegmann et al., 2023) and an increased trait sexual motivation may be specific for problematic pornography use (Stark et al., 2017). Overall, it needs to be considered that predisposing factors may also change due to addictive behaviours. While some factors are assumed to be relatively stable (e.g., personality traits) other factors might be altered with increasing symptom severity and negative consequences experienced due to the behaviour (e.g., the degree of depression or social anxiety may increase).

Specific environmental or situational factors (e.g., acceptance and availability of offers) were also shown to be relevant for the risk of developing a behavioural addiction. For example, in countries where gaming is very popular (e.g., South Korea) and where an abundant gaming infrastructure (i.e. 24/7 gaming cafes) has been established or in those with a higher cultural acceptance of gaming, the prevalence of gaming disorder is higher compared to countries where gaming is less popular (Stevens et al., 2021). Cultural influences are also evident in gambling disorder, particularly concerning the legalization and advertising restrictions related to gambling (e.g., for sports betting during the football World Cup; Brevers et al., 2022). Although it is not clear to what extent environmental and situational factors explain differences in prevalence rates, these factors are often addressed in public health approaches aiming to reduce prevalence rates (e.g., King et al., 2018; Ukhova et al., 2024).

As mentioned earlier, the development of cue reactivity and craving is central to many theoretical models of behavioural addiction. For substance use disorders, there is robust evidence that cue reactivity and craving are important predictors of drug use and relapse (e.g., Vafaie & Kober, 2022). For behavioural addictions, a similar key role of cue reactivity and craving has been demonstrated (e.g., Antons et al., 2020; Starcke et al., 2018).

Some models consider reductions in executive functions and inhibitory control to be relevant as these can lead to difficulties in self-control to resist temptations. For most substance use disorders there is evidence for dysfunctions in working memory, cognitive flexibility, and decision-making abilities (Verdejo-Garcia, 2017). Yet, it is still unclear whether inhibitory control deficits are a vulnerability factor or a consequence of the addictive behaviour or both. Research on cognitive control abilities in behavioural addictions is still rare and results are mixed. Deficits in decision making (only in the risk domain) and other cognitive domains have been reported in individuals with (specific) Internet addiction compared to those without, however, with small effect sizes (Ioannidis, Hook, Goudriaan, et al., 2019; Müller et al., 2023). Inconsistent findings are also reported for

gambling disorder (Ioannidis, Hook, Wickham, et al., 2019; Verdejo-Garcia & Manning, 2015) and buying-shopping disorder (Thomas et al., 2023). It is assumed that cognitive control functions may not be impaired in general, but when being confronted with specific addictive-behaviour-related cues (but evidence is not clear yet; see Antons et al., 2023).

Implicit cognitions are spontaneously activated cognitions during critical decision points (Stacy & Wiers, 2010). For example, individuals suffering from addictions may implicitly evaluate the behaviour as more positive than other behaviours or may have a tendency to approach addiction related stimuli faster than non-addiction related stimuli. Empirical evidence on the role of implicit cognitions in behavioural addictions is still rare. Nevertheless, results of first studies indicate the potential relevance of implicit cognitions in behavioural addictions such as gambling disorder, buying-shopping disorder, and problematic social network use (Flórez et al., 2016; Kessling et al., 2023; Trotzke et al., 2020).

Cognitive biases might also be explicit such as specific expectancies and (distorted) cognitions related to the behaviour. For example, individuals may have the expectation that engaging in the behaviour (is the only thing that) makes them feel better or less bad. It was shown that individuals with gaming disorder report more pronounced reinforcement and avoidance use expectancies (Laier et al., 2018). Metacognitions, defined as stable and explicit knowledge or beliefs as well as the regulation and awareness about one's own cognitive system, have been related to the activation and persistence of coping strategies that may cause negative thoughts and emotions. Maladaptive metacognitions (e.g., 'I cannot control my behaviour') have been associated with substance use disorders as well as with behavioural addictions (Hamonniere & Varescon, 2018; Spada et al., 2015).

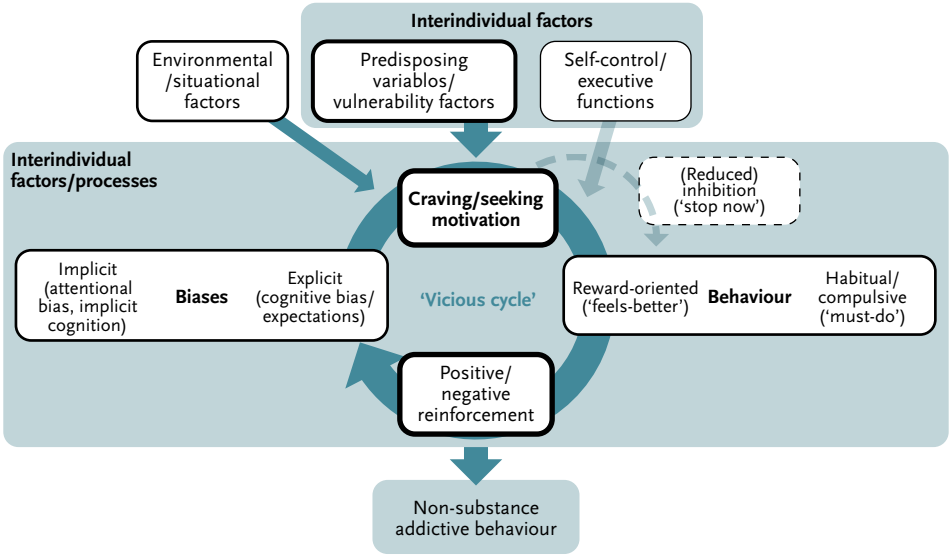
Some theoretical models propose that the behaviour becomes more and more automatic/ habitual with persisting patterns of behaviour even if it is no longer pleasurable or has negative consequences. Habitual behaviours are considered overlearned responses, which are driven by stimulus-response rather than response-outcome associations and are, therefore, operationalized as being non-goal-directed. Accordingly, in tasks measuring habits, habitual behaviour is usually assessed indirectly by the absence of behavioural adaptation in the case of devaluation (Watson et al., 2022). With this narrow definition, empirical results on substance use disorders in humans have been ambiguous (Doñamayor et al., 2022). As habits are behavioural responses that have been overlearned over a certain period of time (sometimes years), it is difficult to operationalize them under laboratory conditions. As outlined earlier, the involvement of habits in addictions has been questioned and results from animal studies are applicable to humans to a very limited extent. There are, however, some studies with the Pavlovian-Instrumental Transfer (PIT) paradigm, which is frequently used in research on habits in substance use disorders (Cartoni et al., 2016), showing the so-called PIT-effect (indicating habitual behaviours after devaluation of the stimulus/response) also in behavioural addictions, more specifically gaming disorder (Qin et al., 2023; Vogel et al., 2018; Xu et al., 2024). However, individuals within their natural environment often describe their behaviour as habitual, e.g., 'my sensitivity is diminished and the activity [use of pornography] is

more habitual than satisfying' (Ince et al., 2023, p. 6). Future studies will demonstrate how 'habitual' the seemingly habitual behaviour really is in individuals with behavioural addictions and to which degree the seemingly habitual responses are still goal-directed.

Central to theoretical models on the development of addictive behaviours is the highly rewarding and relieving nature of the behaviour and associated reinforcement learning mechanisms (positive and negative reinforcement). Some empirical studies evaluated if individuals with behavioural addictions show altered reinforcement learning mechanisms with regard to specific reinforcers (e.g., gaming, pornography) and general reinforcers (e.g., money). Results on general reward processing are mixed, showing increased general reward sensitivity in gambling disorder but not in gaming disorder (Jiménez-Murcia et al., 2017; Lei et al., 2022; Yao et al., 2020).

Figure 1 illustrates the common constructs and mechanisms assumed in theoretical models of behavioural addictions and summarises empirical evidence. Regarding specific reinforcers, symptom severity of behavioural addictions, such as gaming disorder, buying-shopping disorder, and social-network sites use disorder, has consistently been related to higher experienced gratification and compensation through the specific behaviour (Achab et al., 2022; Wegmann et al., 2022).

Figure 1. *Illustration of common constructs and mechanisms assumed in theoretical models on the development of behavioural addictions.*



Note. Main assumptions integrated from the Pathways model of problem and pathological gambling (Blaszczynski & Nower, 2002), the cognitive-behavioural model of Internet gaming disorder (Dong & Potenza, 2014), the cognitive-behavioural model of pathological Internet use (Davis, 2001), and the updated Interaction of Person-Affect-Cognition-Execution (I-PACE) model (Brand et al., 2019) and related ideas (Brand, 2022). Thick borders and bold type indicate more robust empirical evidence. Dashed lines and transparency indicate no clear evidence/ ambiguous findings.

5. SUMMARY OF FINDINGS FROM NEUROIMAGING OF BEHAVIOURAL ADDICTIONS

For the main psychological processes probably involved in behavioural addictions, neural correlates have been identified that parallel findings in substance use disorders. There is reliable evidence for the involvement of the ventral striatum in processing addiction related cues (and partially rewards, e.g., explicit sexual material or its anticipation) and subsequent subjective craving responses in various behavioural addictions (Dong, Wang, et al., 2021; Gola & Draps, 2018; Stark et al., 2018; Trotzke et al., 2021; Weinstein & Lejoyeux, 2020). Later in the addiction process, for example in treatment-seeking individuals, an (additional) involvement of the dorsal striatum in cue reactivity and craving has been demonstrated in several specific behavioural addictions (e.g., Dong, Dong, et al., 2021). There is also evidence (including those from meta-analyses) on structural (e.g., Solly et al., 2022) and functional changes of prefrontal brain regions (Meng et al., 2015; Weinstein et al., 2017). These are examples only, with respect to both brain changes mentioned and articles cited. We argue that existing models, such as the BDMA, should not simply be transferred to behavioural addictions, but that understanding the brain correlates of behavioural addictions is important as it may also give further support for (or disprove) the theoretically argued psychological processes. We know, for example, that the dorsolateral prefrontal cortex is a central structure for executive functions and that prefrontal damage and functional alterations are linked to reduced executive functioning (Jones & Graff-Radford, 2021). If meta-analyses are able to demonstrate structural and/or functional prefrontal alterations in specific behavioural addictions, this further supports the idea that reductions in executive functions and self-control may be important constructs in explaining behavioural addictions. The ventral striatum is (among other cortico-limbic structures such as the orbitofrontal cortex) known to be crucially involved in reward processing, for example in processing of natural rewards like food, sex, and other pleasures (Berridge & Kringelbach, 2015). Again, if we see that individuals with a behavioural addiction like gambling disorder or gaming disorder, as compared to control participants, show higher activities in these brain regions when they are confronted with addiction related cues, this may tell us that obviously their brains react more strongly with the anticipation of pleasure when they watch gambling/gaming scenes or pictures compared to casual gamers. These heightened activities may represent the strong urge and desire (craving) which is considered a main driving path in behavioural addictions. Finally, we know from studies with individuals with obsessive-compulsive and related disorders that changes in basal ganglia, particularly in parts of the dorsal striatum (i.e., caudate nucleus), are related to compulsivity (Robbins et al., 2019). If we obtain evidence that in treatment-seeking individuals with behavioural addictions the dorsal striatum reacts when they are confronted with addiction related stimuli, this may be a further hint for the involvement of compulsions in later phases of behavioural addictions.

In summary, the interpretation of brain imaging findings in behavioural addictions, as in all other fields of clinical neuroimaging, should integrate theories and empirical evidence on psychological processes. At the same time, neuroimaging findings may also be used (together with behavioural data) to empirically test specific theoretical hypotheses.

6. CONCLUSION

Theoretical models can be considered good if they have a dynamic nature driven by required empirical testing and clinical validation (Brand & Potenza, 2021). Although theory development and testing has increased rapidly in the field of behavioural addictions over the past two decades, none of the models can be considered fully valid or definitive. All theoretical models must continue to be empirically tested and modified in order to approximate the true representation of the processes underlying behavioural addictions. In particular, there is a lack of divergent model testing and comparison of processes specifically involved in behavioural addictions, as distinct from substance use disorders and other (often comorbid) disorders such as obsessive-compulsive-related disorders, anxiety, and depression. Most of the current theoretical models focus on the individual level. Interactions between individual and environmental factors may also be considered more intensively in both empirical studies and theory building. In addition, we still do not know much about real causality in terms of, for example, the potential predisposing factors. Reductions of executive functions and self-control may be considered vulnerabilities, but they may also decline further in the course of addictions as a result of addictive behaviours and increases in impulsivity and compulsivity (e.g., Brand, 2022). Also, we yet do not know much about the specificity of certain psychological processes related to specific behavioural addictions. Interactions of specific mechanisms, as assumed in most of the above models, are less well studied so far. For example, considering the potential formation of habits in behavioural addictions, current data do not allow clear conclusions about whether goals are less important in later stages of behavioural addictions or whether goals are still important but perhaps the goals may change and specific cues may trigger a seemingly automatic goal-activation. In conclusion, the theoretical models of behavioural addictions seem to be a solid basis for future investigations. Even though they already have clinical impact, as they are used for psychoeducation and to inform (new) treatment protocols, they have to be validated and optimized to most appropriately describe the psychological and neurobiological mechanisms underlying behavioural addictions.

REFERENCES

Achab, S., Rothen, S., Giustiniani, J., Nicolier, M., Franc, E., Zullino, D., Mauny, F., & Haffen, E. (2022). Predictors of Gaming Disorder or Protective from It, in a French Sample: A Symptomatic Approach to Self-Regulation and Pursued Rewards, Providing Insights for Clinical Practice. *International Journal of Environmental Research and Public Health, 19*(15).

Antons, S., Brand, M., & Potenza, M. N. (2020). Neurobiology of cue-reactivity, craving, and inhibitory control in non-substance addictive behaviors. *Journal of the Neurological Sciences, 415*, 116952, Article 116952. https://doi.org/10.1016/j.jns.2020.116952

Antons, S., Müller, S. M., Neumann, P., Müller, A., & Steins-Loeber, S. (2023). Stimuli-Specific Inhibitory Control in Disorders Due to Addictive Behaviours: a Review of Current Evidence and Discussion of Methodological Challenges. *Current Addiction Reports, 10*(4), 749-769. https://doi.org/10.1007/s40429-023-00517-z

Bechara, A. (2005). Decision making, impulse control and loss of willpower to resist drugs: A neurocognitive perspective. *Nature Neuroscience, 8*(11), 1458-1463. https://doi.org/10.1038/nn1584

Berridge, Kent C., & Kringelbach, Morten L. (2015). Pleasure Systems in the Brain. *Neuron, 86*(3), 646-664. https://doi.org/10.1016/j.neuron.2015.02.018

Berridge, K. C., & Robinson, T. E. (2016). Liking, wanting, and the incentive-sensitization theory of addiction. *American Psychologist, 71*(8), 670-679. https://doi.org/10.1037/amp0000059

Billieux, J., Maurage, P., Lopez-Fernandez, O., Kuss, D. J., & Griffiths, M. (2015). Can Disordered Mobile Phone Use Be Considered a Behavioral Addiction? An Update on Current Evidence and a Comprehensive Model for Future Research. *Current Addiction Reports, 2*, 156–162. https://doi.org/10.1007/s40429-015-0054-y

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction, 97*(5), 487-499.

Blum, K., Gardner, E., Oscar-Berman, M., & Gold, M. (2012). "Liking" and "wanting" linked to Reward Deficiency Syndrome (RDS): hypothesizing differential responsivity in brain reward circuitry. *Curr Pharm Des, 18*(1), 113-118. https://doi.org/10.2174/138161212798919110

Brand, M. (2022). Can internet use become addictive? *Science, 376*(6595), 798-799. https://doi.org/10.1126/science.abn4189

Brand, M., & Potenza, M. N. (2021). How Theoretical Models Can Inspire Advances in Research and Clinical Practice: The Example of Behavioral Addictions. *SUCHT, 67*(4), 187-194. https://doi.org/10.1024/0939-5911/a000721

Brand, M., Rumpf, H.-J., King, D. L., Potenza, M. N., & Wegmann, E. (2020). Clarifying terminologies in research on gaming disorder and other addictive behaviors: distinctions between core symptoms and underlying psychological processes. *Current Opinion in Psychology, 36*, 49-54. https://doi.org/10.1016/j.copsyc.2020.04.006

Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience & Biobehavioral Reviews, 104*, 1-10. https://doi.org/10.1016/j.neubiorev.2019.06.032

Brand, M., Young, K. S., Laier, C., Wölfling, K., & Potenza, M. N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience & Biobehavioral Reviews, 71*, 252-266. https://doi.org/10.1016/j.neubiorev.2016.08.033

Breiner, M. J., Stritzke, W. G., & Lang, A. R. (1999). Approaching avoidance: A step essential to the understanding of craving. *Alcohol Research & Health, 23*(3), 197-206.

Brevers, D., Vögele, C., & Billieux, J. (2022). The evolving landscape of sports betting: A risk for young people?. In *Wohlbefinden und Gesundheit im Jugendalter: Theoretische Perspektiven, empirische Befunde und Praxisansätze* (pp. 363-392). Wiesbaden: Springer. https://doi.org/10.1007/978-3-658-35744-3

Cartoni, E., Balleine, B., & Baldassarre, G. (2016). Appetitive Pavlovian-instrumental Transfer: A review. *Neuroscience & Biobehavioral Reviews, 71*, 829-848. https://doi.org/https://doi.org/10.1016/j.neubiorev.2016.09.020

Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior, 17*(2), 187-195. https://doi.org/10.1016/S0747-5632(00)00041-8

De Sa Nogueira, D., Merienne, K., & Befort, K. (2019). Neuroepigenetics and addictive behaviors: Where do we stand? *Neuroscience & Biobehavioral Reviews, 106*, 58-72. https://doi.org/https://doi.org/10.1016/j.neubiorev.2018.08.018

Doñamayor, N., Ebrahimi, C., Arndt, V. A., Weiss, F., Schlagenhauf, F., & Endrass, T. (2022). Goal-Directed and Habitual Control in Human Substance Use: State of the Art and Future Directions. *Neuropsychobiology, 81*(5), 403-417. https://doi.org/10.1159/000527663

Dong, G.-H., Dong, H., Wang, M., Zhang, J., Zhou, W., Du, X., & Potenza, M. N. (2021). Dorsal and ventral striatal functional connectivity shifts play a potential role in internet gaming disorder. *Communications Biology, 4*(1), 866. https://doi.org/10.1038/s42003-021-02395-5

Dong, G.-H., Wang, M., Zheng, H., Wang, Z., Du, X., & Potenza, M. N. (2021). Disrupted prefrontal regulation of striatum-related craving in Internet gaming disorder revealed by dynamic causal modeling: results from a cue-reactivity task. *Psychological Medicine, 51*(9), 1549-1561. https://doi.org/10.1017/S003329172000032X

Dong, G., & Potenza, M. N. (2014). A cognitive-behavioral model of Internet gaming disorder: Theoretical underpinnings and clinical implications. *Journal of Psychiatric Research, 58*, 7-11. https://doi.org/10.1016/j.jpsychires.2014.07.005

Everitt, B. J., & Robbins, T. W. (2005, Nov). Neural systems of reinforcement for drug addiction: From actions to habits to compulsion. *Nature Neuroscience, 8*(11), 1481-1489. https://doi.org/10.1038/nn1579

Everitt, B. J., & Robbins, T. W. (2016). Drug Addiction: Updating Actions to Habits to Compulsions Ten Years On. *Annual Review of Psychology, 67*, 23-50. https://doi.org/10.1146/annurev-psych-122414-033457

Flórez, G., Saiz, P. A., Santamaría, E. M., Álvarez, S., Nogueiras, L., & Arrojo, M. (2016, 2016/11/30/). Impulsivity, implicit attitudes and explicit cognitions, and alcohol dependence as predictors of pathological gambling. *Psychiatry Research, 245*, 392-397. https://doi.org/https://doi.org/10.1016/j.psychres.2016.08.039

Gola, M., & Draps, M. (2018, 2018-November-14). Ventral Striatal Reactivity in Compulsive Sexual Behaviors [Mini Review]. *Frontiers in Psychiatry, 9*. https://doi.org/10.3389/fpsyt.2018.00546

Goldstein, R. Z., & Volkow, N. D. (2002). Drug Addiction and Its Underlying Neurobiological Basis: Neuroimaging Evidence for the Involvement of the Frontal Cortex. *American Journal of Psychiatry, 159*(10), 1642-1652. https://doi.org/10.1176/appi.ajp.159.10.1642

Hamonniere, T., & Varescon, I. (2018, 2018/10/01/). Metacognitive beliefs in addictive behaviours: A systematic review. *Addictive Behaviors, 85*, 51-63. https://doi.org/https://doi.org/10.1016/j.addbeh.2018.05.018

Heather, N., Best, D., Kawalek, A., Field, M., Lewis, M., Rotgers, F., Wiers, R. W., & Heim, D. (2018, 2018/07/04). Challenging the brain disease model of addiction: European launch of the addiction theory network. *Addiction Research & Theory, 26*(4), 249-255. https://doi.org/10.1080/16066359.2017.1399659

Hogarth, L. (2020). Addiction is driven by excessive goal-directed drug choice under negative affect: translational critique of habit and compulsion theory. *Neuropsychopharmacology, 45*(5), 720-735. https://doi.org/10.1038/s41386-020-0600-8

Ince, C., Fontenelle, L. F., Carter, A., Albertella, L., Tiego, J., Chamberlain, S. R., & Rotaru, K. (2023). Clarifying and extending our understanding of problematic pornography use through descriptions of the lived experience. *Scientific Reports, 13*(1), 18193. https://doi.org/10.1038/s41598-023-45459-8

Ioannidis, K., Hook, R., Goudriaan, A. E., Vlies, S., Fineberg, N. A., Grant, J. E., & Chamberlain, S. R. (2019). Cognitive deficits in problematic Internet use: A meta-analysis of 40 studies. *The British Journal of Psychiatry*, 1-8.

Ioannidis, K., Hook, R., Wickham, K., Grant, J. E., & Chamberlain, S. R. (2019). Impulsivity in gambling disorder and problem gambling: a meta-analysis. *Neuropsychopharmacology, 44*(8), 1354-1361. https://doi.org/10.1038/s41386-019-0393-9

Ji, Y., Yin, M. X. C., Zhang, A. Y., & Wong, D. F. K. (2022). Risk and protective factors of Internet gaming disorder among Chinese people: A meta-analysis. *Australian & New Zealand Journal of Psychiatry, 56*(4), 332-346. https://doi.org/10.1177/00048674211025703

Jiménez-Murcia, S., Fernández-Aranda, F., Mestre-Bach, G., Granero, R., Tárrega, S., Torrubia, R., Aymamí, N., Gómez-Peña, M., Soriano-Mas, C., Steward, T., Moragas, L., Baño, M., del Pino-Gutiérrez, A., & Menchón, J. M. (2017). Exploring the Relationship between Reward and Punishment Sensitivity and Gambling Disorder in a Clinical Sample: A Path Modeling Analysis. *Journal of Gambling Studies, 33*(2), 579-597. https://doi.org/10.1007/s10899-016-9631-9

Jones, D. T., & Graff-Radford, J. (2021). Executive Dysfunction and the Prefrontal Cortex. *CONTINUUM: Lifelong Learning in Neurology, 27*(6), 1586-1601. https://doi.org/10.1212/con.0000000000001009

Kessling, A., Schmidt, L. D., Brand, M., & Wegmann, E. (2023). Implicit cognitions in problematic social network use. *Journal of Behavioral Addictions, 12*(3), 590-598. https://doi.org/https://doi.org/10.1556/2006.2023.00035

King, D. L., Delfabbro, P. H., Doh, Y. Y., Wu, A. M. S., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2018). Policy and Prevention Approaches for Disordered and Hazardous Gaming and Internet Use: an International Perspective. *Prevention Science, 19*(2), 233-249. https://doi.org/10.1007/s11121-017-0813-1

Koob, G. F., & Volkow, N. D. (2010). Neurocircuitry of Addiction. *Neuropsychopharmacology, 35*(1), 217-238. https://doi.org/10.1038/npp.2009.110

Laier, C., Wegmann, E., & Brand, M. (2018). Personality and cognition in gamers: Avoidance expectancies mediate the relationship between maladaptive personality traits and symptoms of Internet-gaming disorder. *Frontiers in Psychiatry, 9*, 1-8, Article 304.

Lei, W., Liu, K., Chen, G., Tolomeo, S., Liu, C., Peng, Z., Liu, B., Liang, X., Huang, C., Xiang, B., Zhou, J., Zhao, F., Yu, R., & Chen, J. (2022). Blunted reward prediction error signals in internet gaming disorder. *Psychological Medicine, 52*(11), 2124-2133. https://doi.org/10.1017/S003329172000402X

Leshner, A. I. (1997). Addiction Is a Brain Disease, and It Matters. *Science, 278*(5335), 45-47. https://doi.org/doi:10.1126/science.278.5335.45

Maldonado, R., Calvé, P., García-Blanco, A., Domingo-Rodriguez, L., Senabre, E., & Martín-García, E. (2021). Genomics and epigenomics of addiction. *Am J Med Genet B Neuropsychiatr Genet, 186*(3), 128-139. https://doi.org/10.1002/ajmg.b.32843

Meng, Y., Deng, W., Wang, H., Guo, W., & Li, T. (2015). The prefrontal dysfunction in individuals with Internet gaming disorder: a meta-analysis of functional magnetic resonance imaging studies. *Addiction Biology, 20*(4), 799-808. https://doi.org/https://doi.org/10.1111/adb.12154

Müller, A., Claes, L., Georgiadou, E., Möllenkamp, M., Voth, E. M., Faber, R. J., Mitchell, J. E., & de Zwaan, M. (2014). Is compulsive buying

related to materialism, depression or temperament? Findings from a sample of treatment-seeking patients with CB. *Psychiatry Research, 216*(1), 103-107. https://doi.org/https://doi.org/10.1016/j.psychres.2014.01.012

Müller, S. M., Antons, S., Wegmann, E., Ioannidis, K., King, D. L., Potenza, M. N., Chamberlain, S. R., & Brand, M. (2023). *A systematic review and meta-analysis of risky decision-making in specific domains of problematic use of the Internet: Evidence across different decision-making tasks*. [Manuscript submitted for publication].

Noël, X., Brevers, D., & Bechara, A. (2013). A neurocognitive approach to understanding the neurobiology of addiction. *Current opinion in neurobiology, 23*(4), 632-638. https://doi.org/10.1016/j.conb.2013.01.018

Nower, L., Blaszczynski, A., & Anthony, W. L. (2022). Clarifying gambling subtypes: the revised pathways model of problem gambling. *Addiction, 117*(7), 2000-2008. https://doi.org/10.1111/add.15745

Qin, C., Feng, S., Chen, Y., Liao, X., Cheng, X., Tian, M., Zhou, X., Deng, J., Peng, Y., Gong, K., Liu, K., Chen, J., & Lei, W. (2023). Enhanced Pavlovian-to-instrumental transfer in internet gaming disorder. *Journal of Behavioral Addictions, 12*(2), 471-479. https://doi.org/https://doi.org/10.1556/2006.2023.00023

Robbins, T. W., Vaghi, M. M., & Banca, P. (2019). Obsessive-Compulsive Disorder: Puzzles and Prospects. *Neuron, 102*(1), 27-47. https://doi.org/10.1016/j.neuron.2019.01.046

Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: an incentive-sensitization theory of addiction. *Brain Research Reviews, 18*(3), 247-291. https://doi.org/10.1016/0165-0173(93)90013-P

Solly, J. E., Hook, R. W., Grant, J. E., Cortese, S., & Chamberlain, S. R. (2022). Structural gray matter differences in Problematic Usage of the Internet: a systematic review and meta-analysis. *Molecular Psychiatry, 27*(2), 1000-1009. https://doi.org/10.1038/s41380-021-01315-7

Spada, M. M., Caselli, G., Nikčević, A. V., & Wells, A. (2015). Metacognition in addictive behaviors. *Addictive Behaviors, 44*, 9-15. https://doi.org/https://doi.org/10.1016/j.addbeh.2014.08.002

Stacy, A. W., & Wiers, R. W. (2010). Implicit Cognition and Addiction: A Tool for Explaining Paradoxical Behavior. *Annual Review of Clinical Psychology, 6*(Volume 6, 2010), 551-575. https://doi.org/10.1146/annurev.clinpsy.121208.131444

Starcke, K., Antons, S., Trotzke, P., & Brand, M. (2018). Cue-reactivity in behavioral addictions: A meta-analysis and methodological considerations. *Journal of Behavioral Addictions, 7*(2), 227-238. https://doi.org/https://doi.org/10.1556/2006.7.2018.39

Stark, R., Klucken, T., Potenza, M. N., Brand, M., & Strahler, J. (2018). A current understanding of the behavioral neuroscience of compulsive sexual behavior disorder and problematic pornography use. *Current Behavioral Neuroscience Reports, 5*(4), 218-231. https://doi.org/10.1007/s40473-018-0162-9

Stark, R., Kruse, O., Snagowski, J., Brand, M., Walter, B., Klucken, T., & Wehrum-Osinsky, S. (2017). Predictors for (Problematic) Use of Internet Sexually Explicit Material: Role of Trait Sexual Motivation and Implicit Approach Tendencies Towards Sexually Explicit Material. *Sexual Addiction & Compulsivity, 24*(3), 180-202. https://doi.org/10.1080/10720162.2017.1329042

Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry, 55*(6), 553-568. https://doi.org/10.1177/0004867420962851

Tang, H., Li, Y., Dong, W., Guo, X., Wu, S., Chen, C., & Lu, G. (2024). The relationship between childhood trauma and internet addiction in adolescents: A meta-analysis. *Journal of Behavioral Addictions, 13*(1), 36-50. https://doi.org/https://doi.org/10.1556/2006.2024.00001

Thomas, T. A., Joshi, M., Trotzke, P., Steins-Loeber, S., & Müller, A. (2023). Cognitive Functions in Compulsive Buying-Shopping Disorder: a Systematic Review. *Current Behavioral Neuroscience Reports, 10*(1), 1-19. https://doi.org/10.1007/s40473-023-00255-6

Trotzke, P., Müller, A., Brand, M., Starcke, K., & Steins-Loeber, S. (2020). Buying despite negative consequences: Interaction of craving, implicit cognitive processes, and inhibitory control in the context of buying-shopping disorder. *Addictive Behaviors, 110*, 106523. https://doi.org/https://doi.org/10.1016/j.addbeh.2020.106523

Trotzke, P., Starcke, K., Pedersen, A., & Brand, M. (2021). Dorsal and ventral striatum activity in individuals with buying-shopping disorder during cue-exposure: A functional magnetic resonance imaging study. *Addiction Biology, 26*(6), e13073. https://doi.org/https://doi.org/10.1111/adb.13073

Ukhova, D., Marionneau, V., Nikkinen, J., & Wardle, H. (2024). Public health approaches to gambling: a global review of legislative trends. *The Lancet Public Health, 9*(1), e57-e67. https://doi.org/10.1016/S2468-2667(23)00221-9

Vafaie, N., & Kober, H. (2022). Association of Drug Cues and Craving With Drug Use and Relapse: A Systematic Review and Meta-analysis. *JAMA Psychiatry, 79*(7), 641-650. https://doi.org/10.1001/jamapsychiatry.2022.1240

Verdejo-Garcia, A. (2017). Chapter 16 - Executive Dysfunction in Addiction. In E. Goldberg (Ed.), *Executive Functions in Health and Disease* (pp. 395-403). Academic Press. https://doi.org/https://doi.org/10.1016/B978-0-12-803676-1.00016-7

Verdejo-Garcia, A., & Manning, V. (2015). Executive Functioning in Gambling Disorder: Cognitive Profiles and Associations with Clinical Outcomes. *Current Addiction Reports, 2*(3), 214-219. https://doi.org/10.1007/s40429-015-0062-y

Vogel, V., Kollei, I., Duka, T., Snagowski, J., Brand, M., Müller, A., & Loeber, S. (2018). Pavlovian-to-instrumental transfer: A new paradigm to assess pathological mechanisms with regard to the use of Internet applications. *Behavioural brain research, 347*, 8-16. https://doi.org/https://doi.org/10.1016/j.bbr.2018.03.009

Volkow, N. D., Koob, G. F., & McLellan, A. T. (2016). Neurobiologic Advances from the Brain Disease Model of Addiction. *New England Journal of Medicine, 374*(4), 363-371. https://doi.org/doi:10.1056/NEJMra1511480

Volkow, N. D., Wang, G. J., Fowler, J. S., & Tomasi, D. (2012). Addiction circuitry in the human brain. *Annu Rev Pharmacol Toxicol, 52*, 321-336. https://doi.org/10.1146/annurev-pharmtox-010611-134625

Watson, P., O'Callaghan, C., Perkes, I., Bradfield, L., & Turner, K. (2022). Making habits measurable beyond what they are not: A focus on associative dual-process models. *Neuroscience & Biobehavioral Reviews, 142*, 104869. https://doi.org/https://doi.org/10.1016/j.neubiorev.2022.104869

Wegmann, E., Antons, S., & Brand, M. (2022). The experience of gratification and compensation in addictive behaviors: How can these experiences be measured systematically within and across disorders due to addictive behaviors? *Comprehensive Psychiatry, 117*, 152336. https://doi.org/https://doi.org/10.1016/j.comppsych.2022.152336

Wegmann, E., Müller, S. M., Kessling, A., Joshi, M., Ihle, E., Wolf, O. T., & Müller, A. (2023). Online compulsive buying-shopping disorder and social networks-use disorder: More similarities than differences? *Comprehensive Psychiatry, 124*, 152392. https://doi.org/10.1016/j.comppsych.2023.152392

Weinstein, A., & Lejoyeux, M. (2020). Neurobiological mechanisms underlying internet gaming disorder *Dialogues in Clinical Neuroscience, 22*(2), 113-126. https://doi.org/10.31887/DCNS.2020.22.2/aweinstein

Weinstein, A., Livny, A., & Weizman, A. (2017). New developments in brain research of internet and gaming disorder. *Neuroscience & Biobehavioral Reviews, 75*, 314-330. https://doi.org/https://doi.org/10.1016/j.neubiorev.2017.01.040

Wiers, R. W., & Stacy, A. W. (2006). Implicit Cognition and Addiction. *Current Directions in Psychological Science, 15*(6), 292-296. https://doi.org/10.1111/j.1467-8721.2006.00455.x

Xu, L.-x., Zhang, J.-l., Geng, X.-m., Song, K.-r., Zeng, P.-p., Potenza, M. N., Schad, D. J., & Zhang, J.-t. (2024). Pavlovian-to-instrumental transfer and outcome-devaluation

effects in individuals with gaming experience. *Computers in Human Behavior, 155*, 108188. https://doi.org/https://doi.org/10.1016/j.chb.2024.108188

Yao, Y.-W., Liu, L., Worhunsky, P. D., Lichenstein, S., Ma, S.-S., Zhu, L., Shi, X.-H., Yang, S., Zhang, J.-T., & Yip, S. W. (2020). Is monetary reward processing altered in drug-naïve youth with a behavioral addiction? Findings from internet gaming disorder. *NeuroImage: Clinical, 26*, 102202. https://doi.org/https://doi.org/10.1016/j.nicl.2020.102202

6

UNPACKING DIGITAL ADDICTIONS THROUGH THE LENS OF NEUROSCIENCE

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ABSTRACT:

"Digital" addiction is a debated concept. Much of the research carried out in this field relies on traditional self-report methods and, to a minor extent, on computer-based experimental research. In this chapter, we aim to go beyond the above-mentioned methods and summarize the neurobiological risk factors that have been explored in the context of problematic digital media usages, including (i) brain correlates, (ii) genetics, (iii) epigenetic influences, and (iv) hormones. Altogether, neurobiological factors can give a more comprehensive overview of the pathogenesis of problematic usage of digital media, such as Internet gaming disorder, Internet addiction, problematic social media use, and problematic smartphone use.

KEYWORDS:

neuroscience, neurobiology, hormones, genetics, digital media addictions

1. DEFINING "DIGITAL" ADDICTIONS

Mounting evidence suggests that extensive, repetitive, and problematic engagement in specific behaviors like gambling, playing video games, using the Internet, shopping, or exercising may share symptomatic commonalities with substance use disorders. Gambling Disorder was the first behavioral addiction, also referred to as a "non-substance addiction" (Petry, 2016), to be formally recognized in the fifth revision of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013). However, its clinical relevance had been acknowledged earlier; it was previously classified as an impulse control disorder under the name "Pathological Gambling" in the DSM-III (Rosenthal, 2020) and recognized as a distinct diagnosis in the *International Classification of Diseases*, Ninth Revision (ICD-9). The initial definition of a specific behavior as 'addictive' paved the way for classifying other excessive behaviors, like Internet Gaming Disorder (IGD), included in the DSM-5 manual under Section 3 (under the section "Conditions for Further Study"), suggesting that this behavior deserved more attention from a research perspective. The IGD has been named Gaming Disorder (GD) in 11th revision of the International Classification of Diseases (ICD-11) by the World Health Organization (Montag, Schivinski, et al., 2021). Based on the evaluated diagnostic criteria for substance use disorders and Gambling disorder, the DSM-5 lists nine criteria for IGD and the ICD-11 reported three for GD. Both DSM-5 and ICD-11 criteria are summarized in Table 1. In the present chapter, we will use the more common label GD to indicate both diagnoses.

Table 1. *List of DSM-5 and ICD-11 criteria for Internet Gaming Disorder (IGD) and Gaming Disorder (GD).*

DSM-5 criteria for Internet Gaming Disorder (IGD) (American Psychiatric Association, 2013) at least 5 criteria should be satisfied over 12 months	**ICD-11 criteria for Gaming Disorder (GD)** (World Health Organization, 2019) all criteria should be satisfied over 12 months
(i) constant preoccupation with games (i.e., "cognitive salience")	(i) impaired control over gaming behavior, including onset, frequency, intensity, duration, termination, context
(ii) a loss of interest in previous hobbies and entertainment due to excessive gaming (i.e., "behavioral salience")	(ii) increasing priority given to gaming behavior, in other words gaming takes precedence over daily activities and person's interests
(iii) loss of control as individuals make unsuccessful attempts to control or reduce their gaming behavior	(iii) continuation or increase of gaming behavior despite social and functional deficits in everyday life, such conflict with family, poor scholastic or work performance, and negative consequences on health.
(iv) continue to game excessively despite the knowledge that this conduct creates psychosocial problems	
(v) withdrawal symptoms, e.g., irritability, sadness, when gaming is not possible	
(vi) tolerance, e.g., the need to play games for an increased amount of time and the need to reach higher excitement than before	
(vii) using games to escape or relieve from negative emotions (mood regulation)	
(viii) deceit of family members, therapists, or others regarding the amount of gaming	
(ix) problems related to gaming behavior tackling the social and working spheres, including loss of a significant relationship, job, or educational or career opportunity.	

Not all problematic engagement with new technologies have been defined as clinical diagnoses, but problematic use started to receive attention after the introduction of the term "Internet addiction" by Young et al. (1999). However, researchers criticized the construct of Internet addiction as a disorder with its entity since it can be rather a symptom of an already existing disorder, including substance use disorder, attention-deficit hyperactivity disorder, depression, hostility, and social anxiety disorder (Ho et al., 2014; C.-H. Ko et al., 2012) or emotional dysregulations (Marciano et al., 2022) or "just" a coping style/compensatory behavior (Kardefelt-Winther, 2014), and that is important to avoid "overpathologizing" daily life activities (Billieux et al., 2015). Others have either claimed that different kinds of Internet addiction exist or that the Internet should be considered as the medium (McLuhan, 2008), and we can refer to "addiction *on* the Internet " and not a condition *per se*, i.e., "addiction *to* the Internet " (Sim et al., 2012). Individuals can become addicted to a particular application or type of Internet use (Montag et al., 2015; Rozgonjuk et al., 2023),

which triggers further pathological behaviors and compulsive consumption, like online shopping, gambling, trading, e-mailing, cyber-sexual activities, and database searching, to name just a few. In this case, the addiction is to a specific function of the Internet because of pre-existing psychopathology, and these content-specific dependencies would also occur in the absence of the Internet (Davis, 2001). Because of the lack of agreement, Internet addiction was not included in the DSM-5. Nevertheless, the same criteria of GD have been commonly applied to define other forms of "problematic" digital media use, including Internet, smartphone and social media problematic use (Jo et al., 2019), which are more generalized (Montag et al., 2015; Montag, Wegmann, et al., 2021). The heterogeneity in definitions is reflected in the plethora of different measures used (Laconi et al., 2014), like social media (Duradoni et al., 2020) and smartphone addiction (Harris et al., 2020), in which the word "Internet" is often interchanged with the online platform of interest. Yet, none of them is considered the "gold standard" since psychometric properties remain largely inconsistent and limited. Indeed, a criticism of Internet addiction measures is that they are too broad, encompassing diverse symptoms and Internet usage, limiting the possibility of understanding what is really "problematic" or "addictive".

Furthermore, the difficulty of defining digital addictions is linked to high rates of comorbidity. For example, Internet addiction has been related to symptoms of attention deficit hyperactivity disorder and depression (Reuter M, 2015), hostility or aggression, obsessive-compulsive symptoms, and anxiety (Carli et al., 2013). The co-presence of psychological symptoms with Internet addiction can be explained considering that previous psychopathological conditions would lead to or increase symptoms of Internet addiction, and vice versa, or both disorders may include shared underlying biological and behavioral mechanisms (Klugah-Brown et al., 2022), including risk factors and contextual influences, although comorbidity can be overrated depending on measures used or other methodological inadequacies (Ko et al., 2012).

Prevalence data showed that GD has a worldwide prevalence of 3.05%, though that was reduced to 1.96% after considering only studies with stringent sampling criteria (Stevens et al., 2021). More than 35% of U.S. Internet users have been described as "Internet addicted" (The Center for Internet & Technology Addiction, 2024) —though in the survey, the criteria used were very broad without a clear reference to a clinical diagnosis, and from 5% to 31% have been classified as addicted to social media (Cheng et al., 2021). However, rate estimates change depending on criteria used to define the technological addiction, definitions, population characteristics and countries, and measures used. Together with the lack of evaluated animal models for behavioral addictions (for initial models, see Chebolu & Dayan, 2024 and Tam et al., 2024), these inconsistencies currently impede progress in determining the neurobiological factors underlying digital addictions. Hence, in the current chapter, we will refer to problematic digital media usage to include all types of digital media addictive-like behaviors that do not refer to a diagnosis *per se,* and we will refer to specific behaviors like GD (and Internet "addiction") when a diagnosis or a scale used to screen for that condition has been reported in the cited study.

2. NEUROBIOLOGICAL FACTORS RELATED TO DIGITAL ADDICTIONS

The Interaction of Person-Affect-Cognition-Execution (I-PACE) model (Brand et al., 2016, 2019) explores the neurobiological mechanisms underlying specific technological problematic usages and behavioral addictions more generally (such as gambling, gaming, buying-shopping, and compulsive sexual behavior disorders). Individuals have certain predispositions and encounter specific contexts of digital media use, making them more susceptible to engaging with digital content in problematic ways. Their cognitive and emotional responses and the gratifications they receive can reinforce and trigger repetitive patterns of online behavior. The repetitive behavior is coupled with lower efficiency in neural systems related to self-control, like the pre-frontal cortex, thus ending up in a failure of control over urges and increased impulsivity, which fosters compulsion and escalates to addiction. The lack of inhibitory control is especially crucial in the early stages of the addiction, whereas, in later stages, specific reward expectancies are at the base of conditioning processes, which lead to compulsive use. Specific technological addictions provide gratification and relief from negative moods, thus modifying or even creating (new) individual coping styles that remain fixed over time.

In the sections below, we summarize key studies and findings related to different neurobiological factors, including (i) brain correlates, (ii) genetic, (iii) epigenetic influences, and (iv) hormones.

2.1 Brain correlates

Multiple neural systems have been studied in behavioral addictions, mostly related to the reward circuit, i.e., the mesolimbic dopaminergic system. Initial models propose that behavioral addictions involve adaptations in the mesolimbic and mesocortical dopamine pathways originating in the ventral tegmental area with projections to the nucleus accumbens and the orbital frontal cortex (Sharma et al., 2020) and that these alterations may resemble alterations observed in substance addictions. Neuroimaging studies identified significant structural and functional changes in the brain related to problematic digital media behaviors within these pathways and regulatory frontal systems, including decreased grey matter density and volume in striatal as well as pre-frontal and orbitofrontal cortices and altered reward-related brain activity (Cerniglia et al., 2017; Marciano et al., 2021; Weinstein, 2022; Weinstein, 2017; Yu et al., 2022; Zhou et al., 2020). A previous study also highlighted the involvement of the brain's reward system, showing that receiving "likes" on Instagram activates similar neural responses to those triggered by monetary rewards (Sherman et al., 2016). In GD and problematic digital media usages, structural changes in frontal and pre-frontal regions involved in cognitive control like the anterior cingulate cortex, DLPFC, and lateral OFC (Cerniglia et al., 2017; F. Zhou et al., 2017) as well as changes in regions involved in attentional, social and self-referential processes such as the default mode network (DMN) have been reported (Wei et al., 2024).

Also, neurostructural adaptations in the vmPFC may mediate the association between problematic smartphone use and daily habitual tendencies, defined as the combination of automaticity, i.e. automatic responses elicited by contexts, and routine, i.e. including regular behavioral patterns executed daily (Zhou et al., 2024).

Much emphasis has been placed on the adolescent brain due to the maturational imbalance between the cognitive control and motivation-reward systems (with the first not reaching maturity until 25 years of age) (Mills et al., 2014). In adolescent studies including both clinical and non-clinical samples, longer screen times reported by the participants or a clinical "diagnosis" of Internet addiction or scoring high in digital media addictive behaviors were associated with less functional and structural connections between top-down cognitive control structures, including areas dedicated to attention and cognitive control, while a positive association was reported with activity in the reward circuit (including the striatum and ventral tegmental area) (see Marciano et al., 2021, for a scoping review).

Different mechanisms can explain how social media experiences can influence the young brain (Crone & Konijn, 2018), including, for example, social exclusion —with stronger reactivity of brain regions involved in arousal and negative affect— and peer judgments —activating socio-affective brain circuitry related to higher sensitivity to social input. Also, anxious behaviors on social media can lead to frequent checking behaviors over time associated with modifications in neural sensitivity to social rewards and punishments in early adolescents (Maza et al., 2023). Scholars have suggested that the age barrier of 13 years for social media platforms —often being accessed via the smartphone— should be taken seriously by introducing functioning age verification checks (Montag et al., 2024). The authors come to this conclusion against the background of problems arising from social media being related to body dissatisfaction, contact with non-age-appropriate content, cyberbullying, and discussions around addictive behaviors. That said, more research is needed to establish causality in this field.

Brain changes are mirrored in changes in cognitive performances, with problematic usage of the Internet marked by impaired inhibitory control, decision-making, and working memory (Ioannidis et al., 2019), partly resembling findings in other substance use disorders (however, see also Yu et al., 2022). This all said, two recent narrative reviews (Montag et al., 2023; Montag & Becker, 2023) mentioned the shortcomings in the literature. Aside from a general lack of well-controlled studies, some older works are underpowered in adolescent users due to the lack of control for multiple testing and are hard to compare. In particular, regarding the question of how smartphone and/or social media overuse impact the developing brain, much still needs to be studied. For example, neuroimaging studies examining correlations between the structural architecture of the brain and problematic digital media use behaviors (e.g., MRI, DTI) should include more sophisticated measures of digital behaviors, including objective data like trace data, data donation packages or information obtained from screenshot analyses. Also, fMRI studies should employ more naturalistic and ecologically valid experimental

paradigms to more closely mimic online behavior in the real world (e.g., exposure to fast-paced videos like TikTok). In addition, different ages can lead to different windows of susceptibility (Orben et al., 2022), so it is important to differentiate between age ranges when conducting experiments and interpreting results.

2.2 Genetic influences

Unlike other types of addictive behaviors, such as substance abuse or gambling, few studies have focused on identifying genetic predictors of problematic digital media usages. The first twin study in 2014 surveyed 825 Chinese adolescents and estimated a genetic component of 58%-66% (M. Li et al., 2014), comparable to the one of substance addictions (Paik et al., 2017). Subsequent studies found similar results in Turkish, Dutch, Australian, and German twin cohorts, with genetic contributions ranging from 19% to 86% (Ayorech et al., 2023; Hahn et al., 2017; Long et al., 2016; Vink et al., 2016). Small pilot studies explored polymorphic regions of different candidate genes such as the dopamine D2 receptor gene (DRD2), the catecholamine-o-methyltransferase gene (COMT), and the serotonin transporter gene (SS-5HTTLPR, rs25531) (Han et al., 2007; Paik et al., 2017). Early studies in South Korea linked minor alleles associated with low dopamine production (rs4680) and fewer dopamine receptors (rs1800497) with excessive Internet video game playing behaviors (Han et al., 2007). However, no significant differences were found between different allele carriers and problematic digital media usages (Tereshchenko, 2023), while short allelic variants of the serotonin transporter gene (SS-5HTTLPR, rs25531) have been associated with excessive Internet use (Y. S. Lee et al., 2008), particularly in men. Montag and colleagues (2012) tested the gene coding for the nicotinic acetylcholine receptor subunit alpha 4 (CHRNA4) as a candidate for Internet addiction in 132 participants with problematic Internet use (according to the Internet Addiction Test Questionnaire) and 132 age- and sex-matched controls from a general population from a university setting. Results showed that the T-variant (CC genotype) of the rs1044396 polymorphism on the CHRNA4 gene appeared with significantly higher frequency in the group reporting addictive behaviors, especially in females. That further supported the hypothesis that this gene is involved in biological mechanisms that lead to negative emotionality and personality traits like neuroticism (Markett et al., 2011).

A pilot study investigated the relationship between the genetic polymorphism of DRD2 (-141C and C957T) and ANKK1 (Taq1A), using blood samples, with GD symptoms and related temperament traits in 150 participants (Paik et al., 2017) who received or not a diagnosis of GD according to the DSM-5. Genotype and allele distributions of three polymorphisms did not differ significantly between GD and control groups. However, some GD symptoms were linked to the -141C Ins/Del polymorphism in males. Specifically, the del- genotype was linked to a higher prevalence of G6 (excessive gaming despite psychosocial problems) and G8 (gaming to escape negative moods) compared to the del+ genotype, while no significant results were found in females. This genotype has also been linked to alcoholism and high novelty seeking.

Park et al. (2018) investigated genetic variations in five genes (DRD4, DAT1, NET8, CHRNA4, and CRHR1 through blood samples) related to stress and addiction in IGD and non-IGD groups in 230 male adolescents screened with the Korea Agency for Digital Opportunity and Promotion (KADO) from a school setting. Among all, only the CRHR1 gene (rs28364027) showed significant differences in genotype and allele frequencies between the groups, with the AA genotype increasing the risk of IGA by 2.69 times compared to the G-carrier genotype. To note, the non-significant result on the DRD4 gene partially contrasted with Western studies, which link this polymorphism to addictive disorders like substance abuse, particularly the 7-repeat allele variant. However, in Asian populations, the DRD4 gene has not been associated with such substance abuse, partially because the 7-repeat allele in Asians is very rare. That underlines the importance of considering how genotype distribution varies by ethnicity and warrants further research on its influence on GD across different ethnicities, countries, and cultures.

Kim et al. (2022) investigated the role of interpersonal stressors and coping in the interaction between DRD2 polymorphisms (C957T and Taq1 collected from saliva samples) and problematic gaming in 168 college students. No differences were found between DRD2 Taq1 risk allele carriers and non-carriers, though a significant GxE interaction effect was found for DRD2 C957T on problematic gaming: individuals carrying both the DRD2 C957T T allele and the Taq1 A1 allele (i.e., individuals with a hypodopaminergic dysfunctional state) were more prone to experiencing increased problematic gaming under the influence of interpersonal stress, with avoidant coping strategies mediating this relationship. Interestingly, avoidance patterns, such as escapism and avoidance as coping, can escalate into addiction by mediating the relationship between psychological difficulties like stress, loneliness, anxiety and, for example, GD (Melodia et al., 2022). Neurobiological studies suggest that DRD2 C957T T and DRD2 Taq1 A1 alleles may impair dopamine-mediated stress coping mechanisms, thus reducing individuals' ability to manage stress effectively and predisposing to mental health pathologies like mood disorders and schizophrenia (González-Castro et al., 2016; Zou et al., 2012).

Considering these results, interventions should target interpersonal stressors, emphasizing coping skills and relationship problem-solving strategies, especially for at-risk individuals. Genetically informed programs can delay risky behaviors in specific genotype carriers, suggesting potential for targeted approaches in reducing addictive behaviors like GD, thus offering a more efficient and impactful approach compared to universal interventions.

2.2.1 *Serotonin*

Serotonin neurons are dense in the pre-frontal cortex (PFC), which modulates social perception and experience. The orbitofrontal cortex (OFC) within the PFC evaluates social rewards and risks, integrates context, emotions, and memory, and suppresses negative thoughts linked to early parental care. Serotonin also affects the nucleus accumbens (NAc) for social rewards and the medial preoptic area (MPOA) of the hypothalamus for

maternal behavior. Thus, serotonin-related regulations are widely involved in planning emotional and behavioral responses to environmental social stimuli, especially when social incentives are mediated by self and others' expectations. Bonassi et al. (2022) investigated how the interaction between the serotonin transporter gene and childhood caregiver relationships influences adults' online social interactions on Instagram. Fifty-seven participants provided buccal mucosa samples for genetic analysis (SNP: rs25531), and had their Instagram profiles analyzed for social productivity (posts), prosocial activity (followings), social attraction (followers), and the Social Desirability Index (SDI - ratio of followers to followings). Results showed that rs25531 interacted with recalled parental care and over-protection in shaping social behavior on Instagram. T/T homozygotes exhibited varying Instagram social conduct based on the quality of parental care experienced in childhood: T/T homozygotes with high maternal care showed increased Instagram SDI, while those with low maternal care showed a decrease. Conversely, C-carriers displayed the opposite pattern, hence T/T homozygotes benefit more from positive maternal relationships compared to C-carriers, who are less affected by both supportive and neglectful caregiving. Interestingly, the rs25531 polymorphism may influence 5-HTTLPR expression, which could affect serotonin-mediated processes like sensory processing and emotional decision-making. Scholars suggested this gene modulates sensitivity to social expectations and environmental factors more than anxiety or avoidance in close relationships, aligning with the concept of genetic susceptibility to beneficial or detrimental effects of enriching or undermining circumstances.

2.2.2 *Oxytocin*

Oxytocin is a hormone known for its role in social bonding and emotional attachment (Kendrick et al., 2018; Quintana et al., 2021). When studying the genetics of oxytocin, the susceptibility hypothesis posits that alleles (e.g., G or A) of a genetic region (e.g., oxytocin receptor gene rs2254298) determine the degree of sensitivity to environmental effects (e.g., early parental care quality), making individuals genetically more susceptible to life events and experiences (Bonassi et al., 2020). Individuals with high genetic sensitivity show more adaptive social behavior in positive environments (e.g., warm parental relationships) and less adaptive behavior after negative events (e.g., parental loss). Conversely, those with low genetic sensitivity are more resistant to both traumatic and beneficial early experiences, leading to a decreased social response.

Carollo et al. (2021) exploratorily researched the association between the oxytocin receptor gene polymorphisms and Instagram sociability (defined by the number of posts, followed people, and followers) by focusing on two OXTR SNPs, i.e., OXTR/rs53576 and OXTR/rs2254298 and assessing adult attachment. Two gene-environment interactions (OXTR/rs53576 SNP * adult close relationship and OXTR/rs2254298 SNP * adult close relationship) on the number of posts were tested, with only a main effect of OXTR/rs53576 on the number of followings found significant. In particular, A/A homozygotes had a higher number of followings than G-carriers, possibly indicating a higher desire

for social interactions —with A/A homozygotes likely to be more genetically inclined to online sociability and less anxious in online activities than G-carriers— though more data on gene-environment perspective are needed.

More recently, Liang et al. (2023) explored whether parent-adolescent conflict and peer victimization on GD may be moderated by genetic factors (specifically, the oxytocin receptor gene rs53576 polymorphism using a saliva DNA extraction kit) in a sample of 673 students. Despite no significant association, the interaction between peer victimization and rs53576 significantly affected GD. Specifically, AA genotype adolescents were more susceptible, with higher peer victimization predicting greater GD risk and lower peer victimization reducing GD risk. That suggested that AA genotype carriers perform better in positive environments and worse in negative ones. This genotype association with higher stress reactivity and lower sociality suggests that peer victimization could exacerbate stress and social difficulties among AA genotype adolescents, possibly driving them toward online gaming as a coping mechanism.

Overall, results suggest oxytocin's therapeutic potential in the treatment of problematic digital media usage can be used in alleviating withdrawal symptoms, reducing anxiety, and enhancing social functioning. Its anxiolytic and antistress properties (e.g., Xin et al., 2020; Xu et al., 2019) make it a compelling candidate for mitigating the psychological stress contributing to problematic online usage behaviors (Tereshchenko, 2023). However, the translation of oxytocin into novel interventions requires to carefully account for efficacious dosage protocols (Kou et al., 2022), variations in serotonergic functioning (Lan et al., 2022; Liu et al., 2021), and sex differences in the effects of oxytocin treatment (Ma et al., 2018).

2.2.3 *Melatonin and circadian rhythm*

Melatonin is implied in circadian rhythm and behaviors. Morning chronotypes (M-types), neutral chronotypes (N-types), and evening chronotypes (E-types) are the three distinct chronotypes that have been related to behavioral addictions. For example, Internet and smartphone addiction are being linked to higher eveningness and delayed bedtimes due to blue light inhibiting melatonin secretion. In this regard, the PER3 gene, which is highly rhythmic and expressed in both the central nervous system and peripheral tissues, plays a crucial role in determining the circadian cycle and phase and may be linked to an individual's circadian preference or tendency to be active at different times of the day. Drafting from 744 blood samples, Li et al. (2024) reported that the prevalence of problematic smartphone use (PSU) was 24.6%, and chronotypes were 18.4% M-types, 71.1% N-types, and 10.5% E-types. PSU correlated with E-types in females but not in males, even after adjusting for confounders. In addition, the PER3 gene DNA methylation negatively moderated the relationship between PSU and chronotype: when PER3 gene DNA methylation exceeded 0.04, PSU had a significantly negative effect on chronotype, with a larger β value of the interaction term (= 1.90) in females. Also, PSU was positively correlated with E-types, especially in females. In general, DNA methylation —an

epigenetic modification— can be due to the exposure to blue light emitted by electronic devices, particularly smartphones, which suppress melatonin secretion, thus influencing circadian rhythms and contributing to a shift towards E-type chronotype.

A recent narrative review on the molecular genetic underpinnings of Internet problematic usages came to the conclusion that much of the (also here) reviewed literature must be seen as preliminary because study findings are hampered by too small sample size and, in particular, the field of the molecular study of Internet use disorders is surprisingly scant (Sindermann et al., 2021; see also these reviews: Montag & Reuter, 2017; Werling & Grünblatt, 2022).

2.3 Epigenetic factors

The term "epigenetics" refers to chromatin changes that alter gene function without varying the DNA sequence. These changes happened as a response to a dynamic environment and consequentially regulate several DNA-related processes like, among others, gene expression, DNA replication and repair, growth, RNA transcription, and cell cycle (De Sa Nogueira et al., 2019; Hamilton & Nestler, 2019). Neuroepigenetics looks at these processes in neurons, including neurodevelopmental, psychiatric, and neurodegenerative disorders (De Sa Nogueira et al., 2019). Substance-use disorders alter the chromatin landscape within specific regions and cells in the brain (Hamilton & Nestler, 2019) —with many neuro epigenetic alterations occurring in the reward circuitry after exposure to drugs (Walker et al., 2015)— thus, studies started to explore epigenetic factors associated with behavioral addictions as well. In general, epigenetics is a means through which the environment interacts with an individual's DNA to vehicle all healthy and unhealthy functions (Nestler, 2014).

Lee et al. (2018) studied Korean teenagers diagnosed with GD using a genome-wide miRNA profiling and validation. Three miRNAs, named hsa-miR-200c-3p, hsa-miR-26b-5p, and hsa-miR-652-3p, were found to be significantly downregulated in the GD group. Notably, individuals with three altered miRNAs had a 22 times higher risk of GD compared to those without any alterations (OR 22, 95% CI 2.29–211.11), with an increasing trend in ORs from 0 to 3 miRNA alterations (r^2 = .996). These miRNAs have been identified as biomarkers of various neuropsychiatric disorders, including schizophrenia and alcohol use disorder, and their dysregulation in GD suggests potential involvement based on downstream gene targets like GABRB2, CNR1, NRXN1, and DPYSL2, which are known for their roles in neuropsychiatric disorders such as addiction and anxiety, indicating their relevance in understanding GD mechanisms. In addition, the three downregulated miRNAs in the GD group were related to 1,230 consistent target genes linked to neural development pathways, including axon guidance and neurogenesis.

Collecting saliva samples from 84 participants, Annunzi et al. (2023) compared epigenetic factors among users with no IA, mild IA and moderate IA symptoms severity. Significant positive correlations were found between IAT scores and DNA methylation levels at various CpG sites of the OXTR gene and DAT1 gene, as well as SERT CpG 1,

while showing significant negative correlations for SERT CpG 2, 3, 5, and the average. Also, the strongest correlations across all CpG sites were observed in the mild group. In the mild IA group, all OXTR CpG sites were more methylated than in other groups. Similarly, the DAT1 gene promoter showed increased methylation at CpG sites 1 and 5 in this group, consistent with findings in other addictions. The variation in DNA methylation of key genes (OXTR, DAT1, SERT) may indicate a potential predisposition to addictive behavior and could be biological markers linked to problematic Internet use behavior, potentially leading to Internet addiction. The most significant changes were observed in the mild group, indicating that early gene regulation alterations might temporarily affect gene expression. These epigenetic changes were absent in participants with the highest IA scores, emphasizing the potential predictive nature of these markers.

This finding highlights the importance of identifying early epigenetic biomarkers to predict the progression of problematic use of digital technologies and select appropriate therapies. Environmental factors, such as academic performance and social isolation, may trigger these changes, with genetic factors playing a lesser role.

2.4 Other hormones

Another hormone that should be considered is leptin, which helps regulate appetite and body energy balance by reducing food intake and influencing fat stores, regulating food cravings and cravings in addiction, and playing a key role in the brain's reward system (Geisel et al., 2018). Leptin can also inhibit the body's response to stress by interacting with the hypothalamus and other brain regions. However, by looking at 14 patients with gambling disorder, 11 with IGD, and 12 healthy subjects, Geisel et al., (2018) did not find any differences in leptin levels among the three groups, suggesting that leptin might not be involved in craving regulation for behavioral addictions.

Choi et al. (2020) looked at different hormones, including Orexin A (a neuropeptide from the hypothalamus involved in appetite regulation and behaviors like drug-seeking and stress); oxytocin (related to social behavior and bonding, affect learning, memory, reward, and stress); melatonin (regulating biological rhythms and physiological function); cortisol (released in stress response); and the Brain-derived neurotrophic factor (BDNF) (which regulates neurotransmitter release, neurogenesis, and synaptic plasticity) from the blood of 73 adolescents with GD and healthy control participants. Elevated secretion of orexin A was found in adolescents with GD, implicating its role in modulating addictive behaviors associated with Internet gaming, akin to its involvement in substance addictions such as morphine and alcohol. Also, the authors found a positive correlation between sICAM-1 expression —driving inflammatory processes associated with several common diseases such as diabetes, heart disease, stroke, and malaria (Bui et al., 2020)— and Internet gaming time among adolescents with GD, indicating that increased sICAM-1 levels may reflect higher inflammation due to prolonged Internet gaming in adolescents with GD.

Finally, cortisol (de Vries et al., 2022) is the hormone released by the hypothalamic–pituitary–adrenal (HPA) axis and the most studied biomarker for stress. Aberrant HCC has been with perceived stress (Rietschel et al., 2016), emotional and behavioral problems, including internalizing and externalizing symptoms (Kornelsen et al., 2019), and being victimized (de Azeredo et al., 2020). Some studies (Afifi et al., 2018; Morin-Major et al., 2016; Shafi et al., 2021a, 2021b) started to investigate the effect of digital media on cortisol levels of teens and families, though further studies are necessary to disentangle how different online problematic usages impact stress levels.

3. CONCLUSIONS

In conclusion, the exploration of problematic digital media usage through the lenses of brain correlates, genetics, epigenetic influences, and hormonal factors reveals a complex interplay of biological and environmental elements. Understanding the brain correlates of excessive digital media use, such as alterations in neural activity and connectivity, provides valuable insights into the cognitive and emotional impacts of this behavior. Genetics contribute to individual susceptibility, with certain genetic profiles potentially influencing one's predisposition to problematic usage patterns. Epigenetic mechanisms further complicate this picture, as environmental factors can modify gene expression and exacerbate or mitigate the effects of digital media consumption, and hormones further add insight and complexity to specific biological mechanisms.

Collectively, these factors highlight the multifaceted nature of digital media-related issues and underscore the necessity for a holistic approach. Future research should continue to integrate these diverse biological dimensions to develop more effective interventions and strategies to better address the challenges posed by problematic digital media use and promote healthier interactions with technology (Montag et al., 2023). This will be a hard task, though, because studying many different biological layers in study participants is not only costly but also difficult in coming up with the right effect size estimates. For instance, it is known that SNPs usually explain only tiny amounts of variance in complex phenotypes (Montag et al., 2020), such as online problematic usages, likely also to be linked to personality traits such as self-directedness (Hahn et al., 2017). Therefore, much larger sample sizes need to be investigated than in most of the molecular genetics papers reviewed here. Although Internet use disorders are studied for many years now, the study of the molecular underpinnings of Internet use disorders remains a neglected field. The MRI field seems to be further developed, in particular regarding the study of Gaming Disorder and generalized Internet addiction (Becker & Montag, 2019), but less so when we try to causally understand the influence of social media and other technology use on the developing brain (Montag et al., 2023).

REFERENCES

Afifi, T. D., Zamanzadeh, N., Harrison, K., & Acevedo Callejas, M. (2018). WIRED: The impact of media and technology use on stress (cortisol) and inflammation (interleukin IL-6) in fast paced families. *Computers in Human Behavior*, *81*, 265–273. https://doi.org/10.1016/j.chb.2017.12.010

American Psychiatric Association (Ed.). (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed). American Psychiatric Association.

Annunzi, E., Cannito, L., Bellia, F., Mercante, F., Vismara, M., Benatti, B., Di Domenico, A., Palumbo, R., Adriani, W., Dell'Osso, B., & D'Addario, C. (2023). Mild Internet use is associated with epigenetic alterations of key neurotransmission genes in salivary DNA of young university students. *Scientific Reports*, *13*(1), 22192. https://doi.org/10.1038/s41598-023-49492-5

Ayorech, Z., Baldwin, J. R., Pingault, J.-B., Rimfeld, K., & Plomin, R. (2023). Gene-environment correlations and genetic confounding underlying the association between media use and mental health. *Scientific Reports*, *13*(1), 1030. https://doi.org/10.1038/s41598-022-25374-0

Becker, B., & Montag, C. (2019). Psychological and neuroscientific advances to understand Internet Use Disorder. *Neuroforum*, *25*(2), 99–107. https://doi.org/10.1515/nf-2018-0026

Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, *4*(3), 119–123. https://doi.org/10.1556/2006.4.2015.009

Bonassi, A., Cataldo, I., Gabrieli, G., Foo, J. N., Lepri, B., & Esposito, G. (2020). Oxytocin Receptor Gene Polymorphisms and Early Parental Bonding Interact in Shaping Instagram Social Behavior. *International Journal of Environmental Research and Public Health*, *17*(19), Article 19. https://doi.org/10.3390/ijerph17197232

Bonassi, A., Cataldo, I., Gabrieli, G., Tandiono, M., Foo, J. N., Lepri, B., & Esposito, G. (2022). The Interaction between Serotonin Transporter Allelic Variation and Maternal Care Modulates Instagram Sociability in a Sample of Singaporean Users. *International Journal of Environmental Research and Public Health*, *19*(9), Article 9. https://doi.org/10.3390/ijerph19095348

Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond Internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience & Biobehavioral Reviews*, *104*, 1–10. https://doi.org/10.1016/j.neubiorev.2019.06.032

Brand, M., Young, K. S., Laier, C., Wölfling, K., & Potenza, M. N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience and* Biobehavioral *Reviews*, *71*, 252–266. https://doi.org/10.1016/j.neubiorev.2016.08.033

Bui, T. M., Wiesolek, H. L., & Sumagin, R. (2020). ICAM-1: A master regulator of cellular responses in inflammation, injury resolution, and tumorigenesis. *Journal of Leukocyte Biology*, *108*(3), 787–799. https://doi.org/10.1002/JLB.2MR0220-549R

Carli, V., Durkee, T., Wasserman, D., Hadlaczky, G., Despalins, R., Kramarz, E., Wasserman, C., Sarchiapone, M., Hoven, C. W., Brunner, R., & Kaess, M. (2013). The Association between Pathological Internet Use and Comorbid Psychopathology: A Systematic Review. *Psychopathology*, *46*(1), 1–13. https://doi.org/10.1159/000337971

Carollo, A., Bonassi, A., Cataldo, I., Gabrieli, G., Tandiono, M., Foo, J. N., Lepri, B., & Esposito, G. (2021). The relation between oxytocin re-

ceptor gene polymorphisms, adult attachment and Instagram sociability: An exploratory analysis. *Heliyon*, *7*(9), e07894. https://doi.org/10.1016/j.heliyon.2021.e07894

Cerniglia, L., Zoratto, F., Cimino, S., Laviola, G., Ammaniti, M., & Adriani, W. (2017). Internet Addiction in adolescence: Neurobiological, psychosocial and clinical issues. *Neuroscience & Biobehavioral Reviews*, *76*, 174–184. https://doi.org/10.1016/j.neubiorev.2016.12.024

Chebolu, S., & Dayan, P. (2024). *Optimal and sub-optimal temporal decisions can explain procrastination in a real-world task*. OSF. https://doi.org/10.31234/osf.io/69zhd

Cheng, C., Lau, Y., Chan, L., & Luk, J. W. (2021). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. *Addictive Behaviors*, *117*, 106845. https://doi.org/10.1016/j.addbeh.2021.106845

Choi, M. R., Cho, H., Chun, J.-W., Yoo, J. H., & Kim, D.-J. (2020). Increase of orexin A in the peripheral blood of adolescents with Internet gaming disorder. *Journal of Behavioral Addictions*, *9*(1), 93–104. https://doi.org/10.1556/2006.8.2019.65

Crone, E. A., & Konijn, E. A. (2018). Media use and brain development during adolescence. *Nature Communications*, *9*(1), 588. https://doi.org/10.1038/s41467-018-03126-x

Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior*, *17*(2), 187–195. https://doi.org/10.1016/S0747-5632(00)00041-8

de Azeredo, L. A., Viola, T. W., Rothmann, L. M., Trentin, R., Arteche, A. X., Kristensen, C. H., Buchweitz, A., & Grassi-Oliveira, R. (2020). Hair cortisol levels and mental health problems in children and adolescents exposed to victimization. *Stress*, *23*(5), 546–555. https://doi.org/10.1080/10253890.2019.1690448

De Sa Nogueira, D., Merienne, K., & Befort, K. (2019). Neuroepigenetics and addictive behaviors: Where do we stand? *Neuroscience & Biobehavioral Reviews*, *106*, 58–72. https://doi.org/10.1016/j.neubiorev.2018.08.018

de Vries, L. P., van de Weijer, M. P., & Bartels, M. (2022). The human physiology of well-being: A systematic review on the association between neurotransmitters, hormones, inflammatory markers, the microbiome and well-being. *Neuroscience & Biobehavioral Reviews*, *139*, 104733. https://doi.org/10.1016/j.neubiorev.2022.104733

Duradoni, M., Innocenti, F., & Guazzini, A. (2020). Well-Being and Social Media: A Systematic Review of Bergen Addiction Scales. *Future Internet*, *12*(2), 24. https://doi.org/10.3390/fi12020024

Geisel, O., Hellweg, R., Wiedemann, K., & Müller, C. A. (2018). Plasma levels of leptin in patients with pathological gambling, Internet gaming disorder and alcohol use disorder. *Psychiatry Research*, *268*, 193–197. https://doi.org/10.1016/j.psychres.2018.06.042

González-Castro, T. B., Hernández-Díaz, Y., Juárez-Rojop, I. E., López-Narváez, M. L., Tovilla-Zárate, C. A., Genis-Mendoza, A., & Alpuin-Reyes, M. (2016). The role of C957T, TaqI and Ser311Cys polymorphisms of the DRD2 gene in schizophrenia: Systematic review and meta-analysis. *Behavioral and Brain Functions*, *12*(1), 29. https://doi.org/10.1186/s12993-016-0114-z

Hahn, E., Reuter, M., Spinath, F. M., & Montag, C. (2017). Internet addiction and its facets: The role of genetics and the relation to self-directedness. *Addictive Behaviors*, *65*, 137–146. https://doi.org/10.1016/j.addbeh.2016.10.018

Hamilton, P. J., & Nestler, E. J. (2019). Epigenetics and addiction. *Current Opinion in Neurobiology*, *59*, 128–136. https://doi.org/10.1016/j.conb.2019.05.005

Han, D. H., Lee, Y. S., Yang, K. C., Kim, E. Y., Lyoo, I. K., & Renshaw, P. F. (2007). Dopamine Genes and Reward Dependence in Adolescents with Excessive Internet Video Game Play. *Journal of Addiction Medicine*, *1*(3), 133. https://doi.org/10.1097/ADM.0b013e31811f465f

Harris, B., Regan, T., Schueler, J., & Fields, S. A. (2020). Problematic Mobile Phone and Smartphone Use Scales: A Systematic Review. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00672

Ho, R. C., Zhang, M. W., Tsang, T. Y., Toh, A. H., Pan, F., Lu, Y., Cheng, C., Yip, P. S., Lam, L. T.,

Lai, C.-M., Watanabe, H., & Mak, K.-K. (2014). The association between Internet addiction and psychiatric co-morbidity: A meta-analysis. *BMC Psychiatry*, *14*(1), 183. https://doi.org/10.1186/1471-244X-14-183

Ioannidis, K., Hook, R., Goudriaan, A. E., Vlies, S., Fineberg, N. A., Grant, J. E., & Chamberlain, S. R. (2019). Cognitive deficits in problematic Internet use: Meta-analysis of 40 studies. *The British Journal of Psychiatry*, *215*(5), 639–646. https://doi.org/10.1192/bjp.2019.3

Jo, Y. S., Bhang, S. Y., Choi, J. S., Lee, H. K., Lee, S. Y., & Kweon, Y.-S. (2019). Clinical Characteristics of Diagnosis for Internet Gaming Disorder: Comparison of DSM-5 GD and ICD-11 GD Diagnosis. *Journal of Clinical Medicine*, *8*(7), Article 7. https://doi.org/10.3390/jcm8070945

Kardefelt-Winther, D. (2014). A conceptual and methodological critique of Internet addiction research: Towards a model of compensatory Internet use. *Computers in Human Behavior*, *31*, 351–354. https://doi.org/10.1016/j.chb.2013.10.059

Kendrick, K. M., Guastella, A. J., & Becker, B. (2018). Overview of Human Oxytocin Research. *Current Topics in Behavioral Neurosciences*, *35*, 321–348. https://doi.org/10.1007/7854_2017_19

Kim, E., Lee, D., Do, K., & Kim, J. (2022). Interaction Effects of DRD2 Genetic Polymorphism and Interpersonal Stress on Problematic Gaming in College Students. *Genes*, *13*(3), Article 3. https://doi.org/10.3390/genes13030449

Klugah-Brown, B., Zhou, X., Wang, L., Gan, X., Zhang, R., Liu, X., Song, X., Zhao, W., Biswal, B. B., Yu, F., Montag, C., & Becker, B. (2022). Associations between levels of Internet Gaming Disorder symptoms and striatal morphology–replication and associations with social anxiety. *Psychoradiology*, *2*(4), 207–215. https://doi.org/10.1093/psyrad/kkac020

Ko, C. H., Yen, J. Y., Yen, C. F., Chen, C. S., & Chen, C. C. (2012). The association between Internet addiction and psychiatric disorder: A review of the literature. *European Psychiatry: The Journal of the Association of European Psychiatrists*, *27*(1), 1–8. https://doi.org/10.1016/j.eurpsy.2010.04.011

Ko, C.-H., Yen, J.-Y., Yen, C.-F., Chen, C.-S., & Chen, C.-C. (2012). The association between Internet addiction and psychiatric disorder: A review of the literature. *European Psychiatry*, *27*(1), 1–8. https://doi.org/10.1016/j.eurpsy.2010.04.011

Kornelsen, E., Buchan, M. C., Gonzalez, A., & Ferro, M. A. (2019). Hair Cortisol Concentration and Mental Disorder in Children With Chronic Physical Illness. *Chronic Stress (Thousand Oaks, Calif.)*, *3*, 2470547019875116. https://doi.org/10.1177/2470547019875116

Kou, J., Zhang, Y., Zhou, F., Gao, Z., Yao, S., Zhao, W., Li, H., Lei, Y., Gao, S., Kendrick, K. M., & Becker, B. (2022). Anxiolytic Effects of Chronic Intranasal Oxytocin on Neural Responses to Threat Are Dose-Frequency Dependent. *Psychotherapy and Psychosomatics*, *91*(4), 253–264. https://doi.org/10.1159/000521348

Laconi, S., Rodgers, R. F., & Chabrol, H. (2014). The measurement of Internet addiction: A critical review of existing scales and their psychometric properties. *Computers in Human Behavior*, *41*, 190–202. https://doi.org/10.1016/j.chb.2014.09.026

Lan, C., Liu, C., Li, K., Zhao, Z., Yang, J., Ma, Y., Scheele, D., Yao, S., Kendrick, K. M., & Becker, B. (2022). Oxytocinergic Modulation of Stress-Associated Amygdala-Hippocampus Pathways in Humans Is Mediated by Serotonergic Mechanisms. *The International Journal of Neuropsychopharmacology*, *25*(10), 807–817. https://doi.org/10.1093/ijnp/pyac037

Lee, M., Cho, H., Jung, S. H., Yim, S.-H., Cho, S.-M., Chun, J.-W., Paik, S.-H., Park, Y. E., Cheon, D. H., Lee, J. E., Choi, J.-S., Kim, D.-J., & Chung, Y.-J. (2018). Circulating MicroRNA Expression Levels Associated With Internet Gaming Disorder. *Frontiers in Psychiatry*, *9*. https://doi.org/10.3389/fpsyt.2018.00081

Lee, Y. S., Han, D. H., Yang, K. C., Daniels, M. A., Na, C., Kee, B. S., & Renshaw, P. F. (2008). Depression like characteristics of 5HTTLPR polymorphism and temperament in excessive Internet users. *Journal of Affective Disorders*,

109(1), 165–169. https://doi.org/10.1016/j.jad.2007.10.020

Li, M., Chen, J., Li, N., & Li, X. (2014). A twin study of problematic Internet use: Its heritability and genetic association with effortful control. *Twin Research and Human Genetics: The Official Journal of the International Society for Twin Studies*, *17*(4), 279–287. https://doi.org/10.1017/thg.2014.32

Li, T., Chen, Y., Xie, Y., Tao, S., Zou, L., Yang, Y., Tao, F., & Wu, X. (2024). *Moderating effects of PER3 gene DNA methylation on the association between problematic mobile phone use and chronotype among Chinese young adults: Focus on gender differences*. https://doi.org/10.1556/2006.2024.00027

Liang, Q., Yu, C., Xing, Q., Chen, P., & Li, S. (2023). Parent-Adolescent Conflict, Peer Victimization, and Internet Gaming Disorder Among Chinese Adolescents: The Moderating Effect of OXTR Gene rs53576 Polymorphism. *Child Psychiatry & Human Development*. https://doi.org/10.1007/s10578-023-01523-y

Liu, C., Lan, C., Li, K., Zhou, F., Yao, S., Xu, L., Yang, N., Zhou, X., Yang, J., Yong, X., Ma, Y., Scheele, D., Kendrick, K. M., & Becker, B. (2021). Oxytocinergic Modulation of Threat-Specific Amygdala Sensitization in Humans Is Critically Mediated by Serotonergic Mechanisms. *Biological Psychiatry. Cognitive Neuroscience and Neuroimaging*, *6*(11), 1081–1089. https://doi.org/10.1016/j.bpsc.2021.04.009

Long, E. C., Verhulst, B., Neale, M. C., Lind, P. A., Hickie, I. B., Martin, N. G., & Gillespie, N. A. (2016). The Genetic and Environmental Contributions to Internet Use and Associations With Psychopathology: A Twin Study. *Twin Research and Human Genetics*, *19*(1), 1–9. https://doi.org/10.1017/thg.2015.91

Ma, X., Zhao, W., Luo, R., Zhou, F., Geng, Y., Xu, L., Gao, Z., Zheng, X., Becker, B., & Kendrick, K. M. (2018). Sex- and context-dependent effects of oxytocin on social sharing. *NeuroImage*, *183*, 62–72. https://doi.org/10.1016/j.neuroimage.2018.08.004

Marciano, L., Camerini, A.-L., & Morese, R. (2021). The Developing Brain in the Digital Era: A Scoping Review of Structural and Functional Correlates of Screen Time in Adolescence. *Frontiers in Psychology*, *12*, 671817. https://doi.org/10.3389/fpsyg.2021.671817

Marciano, L., Camerini, A.-L., & Schulz, P. J. (2022). Neuroticism and Internet addiction: What is next? A systematic conceptual review. *Personality and Individual Differences*, *185*, 111260. https://doi.org/10.1016/j.paid.2021.111260

Markett, S., Montag, C., & Reuter, M. (2011). The nicotinic acetylcholine receptor gene CHRNA4 is associated with negative emotionality. *Emotion*, *11*(2), 450–455. https://doi.org/10.1037/a0021784

Maza, M. T., Fox, K. A., Kwon, S.-J., Flannery, J. E., Lindquist, K. A., Prinstein, M. J., & Telzer, E. H. (2023). Association of Habitual Checking Behaviors on Social Media With Longitudinal Functional Brain Development. *JAMA Pediatrics*, *177*(2), 160–167. https://doi.org/10.1001/jamapediatrics.2022.4924

McLuhan, E. (2008). Marshall McLuhan's Theory of Communication: The Yegg. *Global Media Journal: Canadian Edition*, *1*(1).

Melodia, F., Canale, N., & Griffiths, M. D. (2022). The Role of Avoidance Coping and Escape Motives in Problematic Online Gaming: A Systematic Literature Review. *International Journal of Mental Health and Addiction*, *20*(2), 996–1022. https://doi.org/10.1007/s11469-020-00422-w

Mills, K. L., Goddings, A.-L., Clasen, L. S., Giedd, J. N., & Blakemore, S.-J. (2014). The developmental mismatch in structural brain maturation during adolescence. *Developmental Neuroscience*, *36*(3–4), 147–160. https://doi.org/10.1159/000362328

Montag, C., & Becker, B. (2023). Neuroimaging the effects of smartphone (over-)use on brain function and structure-a review on the current state of MRI-based findings and a roadmap for future research. *Psychoradiology*, *3*, kkad001. https://doi.org/10.1093/psyrad/kkad001

Montag, C., Bey, K., Sha, P., Li, M., Chen, Y.-F., Liu, W.-Y., Zhu, Y.-K., Li, C.-B., Markett, S., Keiper, J., & Reuter, M. (2015). Is it meaning-

ful to distinguish between generalized and specific Internet addiction? Evidence from a cross-cultural study from Germany, Sweden, Taiwan and China. *Asia-Pacific Psychiatry*, *7*(1), 20–26. https://doi.org/10.1111/appy.12122

Montag, C., Demetrovics, Z., Elhai, J. D., Grant, D., Koning, I., Rumpf, H.-J., M. Spada, M., Throuvala, M., & van den Eijnden, R. (2024). Problematic social media use in childhood and adolescence. *Addictive Behaviors*, *153*, 107980. https://doi.org/10.1016/j.addbeh.2024.107980

Montag, C., Ebstein, R. P., Jawinski, P., & Markett, S. (2020). Molecular genetics in psychology and personality neuroscience: On candidate genes, genome wide scans, and new research strategies. *Neuroscience and Biobehavioral Reviews*, *118*, 163–174. https://doi.org/10.1016/j.neubiorev.2020.06.020

Montag, C., Kirsch, P., Sauer, C., Markett, S., & Reuter, M. (2012). The role of the CHRNA4 gene in Internet addiction: A case-control study. *Journal of Addiction Medicine*, *6*(3), 191–195. https://doi.org/10.1097/ADM.0b013e31825ba7e7

Montag, C., Marciano, L., Schulz, P. J., & Becker, B. (2023). Unlocking the brain secrets of social media through neuroscience. *Trends in Cognitive Sciences*, *27*(12), 1102–1104. https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00252-8?fbclid=IwAR1ydhsc3ScEzCALknol72TM6wKmiDNCUtdSWjJH2SomdSjPGETcGaREopc

Montag, C., & Reuter, M. (2017). *Molecular Genetics, Personality, and Internet Addiction Revisited* (pp. 141–160). https://doi.org/10.1007/978-3-319-46276-9_9

Montag, C., Schivinski, B., & Pontes, H. M. (2021). Is the proposed distinction of gaming disorder into a predominantly online vs. offline form meaningful? Empirical evidence from a large German speaking gamer sample. *Addictive Behaviors Reports*, *14*, 100391. https://doi.org/10.1016/j.abrep.2021.100391

Montag, C., Wegmann, E., Sariyska, R., Demetrovics, Z., & Brand, M. (2021). How to overcome taxonomical problems in the study of Internet use disorders and what to do with "smartphone addiction"? *Journal of Behavioral Addictions*, *9*(4), 908–914. https://doi.org/10.1556/2006.8.2019.59

Morin-Major, J. K., Marin, M.-F., Durand, N., Wan, N., Juster, R.-P., & Lupien, S. J. (2016). Facebook behaviors associated with diurnal cortisol in adolescents: Is befriending stressful? *Psychoneuroendocrinology*, *63*, 238–246. https://doi.org/10.1016/j.psyneuen.2015.10.005

Nestler, E. J. (2014). Epigenetic mechanisms of drug addiction. *Neuropharmacology*, *76*, 259–268. https://doi.org/10.1016/j.neuropharm.2013.04.004

Orben, A., Przybylski, A. K., Blakemore, S.-J., & Kievit, R. A. (2022). Windows of developmental sensitivity to social media. *Nature Communications*, *13*(1), 1649. https://doi.org/10.1038/s41467-022-29296-3

Paik, S.-H., Choi, M. R., Kwak, S. M., Bang, S. H., Chun, J.-W., Kim, J.-Y., Choi, J., Cho, H., Jeong, J.-E., & Kim, D.-J. (2017). An association study of Taq1A ANKK1 and C957T and − 141C DRD2 polymorphisms in adults with Internet gaming disorder: A pilot study. *Annals of General Psychiatry*, *16*(1), 45. https://doi.org/10.1186/s12991-017-0168-9

Park, J., Sung, J.-Y., Kim, D.-K., Kong, I. D., Hughes, T. L., & Kim, N. (2018). Genetic association of human Corticotropin-Releasing Hormone Receptor 1 (CRHR1) with Internet gaming addiction in Korean male adolescents. *BMC Psychiatry*, *18*(1), 396. https://doi.org/10.1186/s12888-018-1974-6

Petry, N. M. (2016). Gambling disorder: The first officially recognized behavioral addiction. In *Behavioral addictions: DSM-5® and beyond* (pp. 7–41). Oxford University Press.

Quintana, D. S., Lischke, A., Grace, S., Scheele, D., Ma, Y., & Becker, B. (2021). Advances in the field of intranasal oxytocin research: Lessons learned and future directions for clinical research. *Molecular Psychiatry*, *26*(1), 80–91. https://doi.org/10.1038/s41380-020-00864-7

Reuter M, S. R. (2015). Attention Deficit/Hyperactivity Disorder is a Better Predictor for Problematic Internet use than Depression: Evidence from Germany. *Journal of Addic-*

tion Research & Therapy, *06*(01). https://doi.org/10.4172/2155-6105.1000209

Rietschel, L., Streit, F., Zhu, G., McAloney, K., Kirschbaum, C., Frank, J., Hansell, N. K., Wright, M. J., McGrath, J. J., Witt, S. H., Rietschel, M., & Martin, N. G. (2016). Hair Cortisol and Its Association With Psychological Risk Factors for Psychiatric Disorders: A Pilot Study in Adolescent Twins. *Twin Research and Human Genetics*, *19*(5), 438–446. https://doi.org/10.1017/thg.2016.50

Rosenthal, R. J. (2020). Inclusion of pathological gambling in DSM-III, its classification as a disorder of impulse control, and the role of Robert Custer. *International Gambling Studies*, *20*(1), 151–170. https://doi.org/10.1080/14459795.2019.1638432

Rozgonjuk, D., Schivinski, B., Pontes, H. M., & Montag, C. (2023). Problematic Online Behaviors Among Gamers: The Links Between Problematic Gaming, Gambling, Shopping, Pornography Use, and Social Networking. *International Journal of Mental Health and Addiction*, *21*(1), 240–257. https://doi.org/10.1007/s11469-021-00590-3

Shafi, R. M. A., Nakonezny, P. A., Miller, K. A., Desai, J., Almorsy, A. G., Ligezka, A. N., Morath, B. A., Romanowicz, M., & Croarkin, P. E. (2021a). Altered markers of stress in depressed adolescents after acute social media use. *Journal of Psychiatric Research*, *136*, 149–156. https://doi.org/10.1016/j.jpsychires.2021.01.055

Shafi, R. M. A., Nakonezny, P. A., Miller, K. A., Desai, J., Almorsy, A. G., Ligezka, A. N., Morath, B. A., Romanowicz, M., & Croarkin, P. E. (2021b). An exploratory study of clinical and physiological correlates of problematic social media use in adolescents. *Psychiatry Research*, *302*, 114020. https://doi.org/10.1016/j.psychres.2021.114020

Sharma, B., Sharma, P., & Kumar, P. (2020). *SMARTPHONE IS IT "BEHAVIOUR ADDICTION OR SUBSTANCE ABUSE DISORDER": A REVIEW TO FIND CHEMISTRY BEHIND*. *12*, 1000. https://doi.org/10.13040/IJPSR.0975-8232.12(1).57-64

Sherman, L. E., Payton, A. A., Hernandez, L. M., Greenfield, P. M., & Dapretto, M. (2016). The Power of the Like in Adolescence: Effects of Peer Influence on Neural and Behavioral Responses to Social Media. *PSYCHOLOGICAL SCIENCE*, *27*(7), 1027–1035. https://doi.org/10.1177/0956797616645673

Sim, T., Gentile, D. A., Bricolo, F., Serpelloni, G., & Gulamoydeen, F. (2012). A Conceptual Review of Research on the Pathological Use of Computers, Video Games, and the Internet. *International Journal of Mental Health and Addiction*, *10*(5), 748–769. https://doi.org/10.1007/s11469-011-9369-7

Sindermann, C., Sariyska, R., Elhai, J. D., & Montag, C. (2021). Molecular genetics of neurotransmitters and neuropeptides involved in Internet use disorders including first insights on a potential role of hypothalamus' oxytocin hormone. *Handbook of Clinical Neurology*, *182*, 389–400. https://doi.org/10.1016/B978-0-12-819973-2.00026-5

Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *The Australian and New Zealand Journal of Psychiatry*, *55*(6), 553–568. https://doi.org/10.1177/0004867420962851

Tam, S. K. E., Stryjska, O., Gu, H., & Becker, B. (2024). *Operant Light Seeking in Mice: A Potential Model for Behavioral Disorders*. OSF. https://doi.org/10.31234/osf.io/j49tz

Tereshchenko, S. Y. (2023). Neurobiological risk factors for problematic social media use as a specific form of Internet addiction: A narrative review. *World Journal of Psychiatry*, *13*(5), 160–173. https://doi.org/10.5498/wjp.v13.i5.160

The Center for Internet & Technology Addiction. (2024, May 26). *Technology Addiction Statistics 2024*. https://virtual-addiction.com/technology-addiction-statistics-2024/

Vink, J. M., van Beijsterveldt, T. C. E. M., Huppertz, C., Bartels, M., & Boomsma, D. I. (2016). Heritability of compulsive Internet use in adolescents. *Addiction Biology*, *21*(2), 460–468. https://doi.org/10.1111/adb.12218

Walker, D. M., Cates, H. M., Heller, E. A., & Nestler, E. J. (2015). Regulation of chroma-

tin states by drugs of abuse. *Current Opinion in Neurobiology*, *30*, 112–121. https://doi.org/10.1016/j.conb.2014.11.002

Wei, Z., Guo, Y., Tsang, M. H. L., Montag, C., Becker, B., & Kou, J. (2024). Social media distractions alter behavioral and neural patterns to global-local attention: The moderation effect of fear of missing out. *Computers in Human Behavior*, *157*, 108258. https://doi.org/10.1016/j.chb.2024.108258

Weinstein, A. (2022). Problematic Internet usage: Brain imaging findings. *Current Opinion in Behavioral Sciences*, *47*, 101209. https://doi.org/10.1016/j.cobeha.2022.101209

Weinstein, A. M. (2017). An Update Overview on Brain Imaging Studies of Internet Gaming Disorder. *Frontiers in Psychiatry*, *8*. https://doi.org/10.3389/fpsyt.2017.00185

Werling, A. M., & Grünblatt, E. (2022). A review of the genetic basis of problematic Internet use. *Current Opinion in Behavioral Sciences*, *46*, 101149. https://doi.org/10.1016/j.cobeha.2022.101149

World Health Organization. (2019). *International Statistical Classification of Diseases and Related Health Problems (11th ed.)*. https://icd.who.int/

Xin, F., Zhou, X., Dong, D., Zhao, Z., Yang, X., Wang, Q., Gu, Y., Kendrick, K. M., Chen, A., & Becker, B. (2020). Oxytocin Differentially Modulates Amygdala Responses during Top-Down and Bottom-Up Aversive Anticipation. *Advanced Science*, *7*(16), 2001077. https://doi.org/10.1002/advs.202001077

Xu, X., Li, J., Chen, Z., Kendrick, K. M., & Becker, B. (2019). Oxytocin reduces top-down control of attention by increasing bottom-up attention allocation to social but not non-social stimuli—A randomized controlled trial. *Psychoneuroendocrinology*, *108*, 62–69. https://doi.org/10.1016/j.psyneuen.2019.06.004

Young, K. S. (1999). Internet addiction: Evaluation and treatment. *BMJ*, *319*(Suppl S4), 9910351. https://doi.org/10.1136/sbmj.9910351

Yu, F., Li, J., Xu, L., Zheng, X., Fu, M., Li, K., Yao, S., Kendrick, K. M., Montag, C., & Becker, B. (2022). Opposing associations of Internet Use Disorder symptom domains with structural and functional organization of the striatum: A dimensional neuroimaging approach. *Journal of Behavioral Addictions*, *11*(4), 1068–1079. https://doi.org/10.1556/2006.2022.00078

Zhou, F., Montag, C., Sariyska, R., Lachmann, B., Reuter, M., Weber, B., Trautner, P., Kendrick, K. M., Markett, S., & Becker, B. (2017). Orbitofrontal gray matter deficits as marker of Internet gaming disorder: Converging evidence from a cross-sectional and prospective longitudinal design. *Addiction Biology*, *24*(1), 100–109. https://doi.org/10.1111/adb.12570

Zhou, R., Morita, N., Ogai, Y., Saito, T., Zhang, X., Yang, W., & Yang, F. (2024). Meta-Analysis of Internet Gaming Disorder Prevalence: Assessing the Impacts of DSM-5 and ICD-11 Diagnostic Criteria. *International Journal of Environmental Research and Public Health*, *21*(6), Article 6. https://doi.org/10.3390/ijerph21060700

Zhou, X., Liu, Q., Wang, L., Gan, X., Zhang, R., Liu, X., Jiao, G., Montag, C., Zhao, W., & Becker, B. (2024). The neuroanatomical correlates of daily habitual tendencies and mediating effect on the association between daily habitual tendencies and symptoms of behavioral addictions. *Computers in Human Behavior*, *158*, 108310. https://doi.org/10.1016/j.chb.2024.108310

Zhou, X., Wu, R., Liu, C., Kou, J., Chen, Y., Pontes, H. M., Yao, D., Kendrick, K. M., Becker, B., & Montag, C. (2020). Higher levels of (Internet) Gaming Disorder symptoms according to the WHO and APA frameworks associate with lower striatal volume. *Journal of Behavioral Addictions*, *9*(3), 598–605. https://doi.org/10.1556/2006.2020.00066

Zou, Y.-F., Wang, F., Feng, X.-L., Li, W.-F., Tian, Y.-H., Tao, J.-H., Pan, F.-M., & Huang, F. (2012). Association of DRD2 gene polymorphisms with mood disorders: A meta-analysis. *Journal of Affective Disorders*, *136*(3), 229–237. https://doi.org/10.1016/j.jad.2010.11.012

7

PROBLEMATIC INTERNET AND SOCIAL NETWORK USE. WHAT DO WE KNOW AND WHAT WE DON'T

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ABSTRACT:

Since the 1990s, the problematic use of the internet has been discussed as a potential health issue, whereby the activities that individuals did online then might differ slightly from the activities carried out nowadays. Especially with the upcoming integration of social networks and the popularity of the smartphone, research highlights the importance of understanding the effects of social networks use in daily life. It includes the investigation of positive aspects on well-being such as social support and social integration, but also that the usage of social networks has been related to negative consequences for the individual such as experiences of social exclusion, cyberbullying, fear of missing out, body dysmorphic symptoms as well as addictive usage tendencies. The current chapter provides a short overview regarding the historical development of generalized and specific types of problematic internet use by focusing on problematic social networks use and its positive and negative usage consequences. Therefore, relevant theoretical approaches of problematic internet use in general and more specifically regarding the explanation of the development and maintenance of problematic social networks use will be presented. They postulate the link to substance-use disorder and other addictive behaviors (e.g., gaming and gambling disorders). A proximity is considered to the classification of problematic (internet) use with gaming disorder, classified as disorder due to addictive behavior in the eleventh International Classification System from the World Health Organization. Based on this, terminological recommendations, diagnostic procedures, and comorbidities will be presented. This will be expanded by an empirical overview regarding predisposing variables, affective and cognitive mechanisms, and negative consequences due to the problematic use of the internet and social networks separately, as well as through a comparison of both problematic behaviors. The comparison of the empirical findings emphasizes that besides communalities and divergent mechanisms of different problematic behaviors, social network specific mechanisms seem to play a crucial role in specific disordered usage behaviors. It also allows the formulation of initial considerations regarding potential intervention and treatment approaches for strengthening emotion regulation strategies and self-regulation to reduce online behavior or to define protective mechanisms against a problematic use. The chapter concludes with suggestions as to what should be investigated in future research and what direction should be considered to better understand the specifics of problematic internet use in general, but also the mechanisms involved in the development and maintenance of problematic social network use.

KEYWORDS:

internet addiction, social media, internet use disorder, problematic social network use, problematic social media use, well-being

1. IMPACT OF THE INTERNET AND SOCIAL MEDIA IN DAILY LIFE

Globally the internet has massively impacted the way individuals work, live, obtain information, and communicate with each other. Overall, it is assumed that two thirds of the global population use the internet, even if there are regional differences with for example Africa having the lowest fixed broadband subscriptions (Statista, 2024a). A total of 96% of the global digital population stated that they access the internet primarily via mobile devices (Statista, 2024b). In 2023, the number of social media users reached 5.07 billion individuals who spend an average of 151 minutes online (Statista, 2024c). Thereby, platforms such as TikTok, Instagram, and WeChat are now not only used to keep in touch with others, but also to exchange information and messages. In addition, business models such as influencer or affiliate marketing, subscription models, or crowdfunding have become established, which illustrates the growing interest of industry. The various applications differ in terms of individual features such as how they handle information, the degree of entertainment, but also whether the platforms are primarily video-based, image-based, or text-based. However, in order not to lose the common ground between all these different features, Carr and Hayes (2015) offer the following definition for social media: "Social media are internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others" (p.50). The definition highlights the diversity and specificity of each platform by focusing on the interaction with others, the time span of this interaction as well as the possibility to actively participate or to passively consume content from others (Carr & Hayes, 2015). Thereby, it must be mentioned that the term "social media" covers all media-like content. We use the term social networks (SN) which focuses more on the communicative aspects of these applications.

Research approaches examine the impact of media in general, the internet, and SN in specific on the individual. Psychological research thereby focuses on the interaction

between the individual user and the platform, the type of usage, but also the psychological mechanisms involved. The Uses and Gratification Approach (Katz et al., 1973) is widely used to explain media-related behavior. It addresses the experiences of gratification due to the media use. It is assumed that the individual plays an active part in choosing specific platforms and contents to experience the gratification of needs such as entertainment, finding information, personal identity, and social interaction, which could result in a repeated usage behavior. The dual-factor model of Facebook used by Nadkarni and Hofmann (2012) outlines two basic social needs, which drive the usage of SN: need to belong and need for self-presentation as part of the impression management online (Casale & Fioravanti, 2015). Valkenburg and Peter (2007) focus on the impact of social interaction and gratifying social needs by SN and postulate the dualism of the social-compensation-hypothesis and social-enhancement-hypothesis. The dualism implies that some individuals might benefit from the usage of social media and experience increased social capital and social integration as compensation of unfulfilled needs in real-life, while others might enhance social capital even if they are already socially integrated (Pouwels et al., 2022). Considering the different functions of digital media and particular SN when dealing with (negative) emotions and acute stress, Wolfers and Utz (2022) adapted the Transactional Model of Stress by Lazarus and Folkman (1984) to the context of SN use. The authors emphasize that SN use could act as stressor, as a resource which buffers stress, or as a coping strategy. When using SN as a coping strategy, it could result in beneficial or detrimental outcomes in relation to the adequation between strategy and situational demands (Wolfers & Utz, 2022). This is in line with the results by Wegmann et al. (2023), illustrating SN use as adaptive or maladaptive coping strategy depending on whether the use itself is associated with consequences that display addictive symptoms.

A further key question is the impact of the internet and in particular SN on mental health and well-being. Empirical research illustrates mixed-results, which emphasizes the complexity of both constructs. In a longitudinal study, Schemer et al. (2021) summarize that the frequency of internet and SN use of adolescents does not predict subjective well-being. An overview by Meier and Reinecke (2020) illustrates that computer-mediated communication and SN use show heterogeneous results on the association with mental health. The results also demonstrate that the measurement of usage behavior could differ considerably regarding the assessed variables (e.g., time spent online, size of network, usage behavior), and due to a heterogeneous definition of well-being or "ill-being". Even if studies outline the link between usage behavior and well-being, there is a call for addressing the complexity of SN research considering broader variables besides usage time, technological features and activities, realizing methodological variety, and investigating the interplay of psychological variables with affective and cognitive mechanisms (e.g., Odgers & Jensen, 2020; Orben & Blakemore, 2023; Printstein et al., 2020). Nevertheless, further studies investigating the relationship between SN use and psychological outcome variables showed that the usage behavior itself is associated with feelings of social connectedness, peer integration, and assimilation (Allen et al., 2014).

However, there are also negative effects of SN use such as higher risk of problems related with body images, digital offenses, cyberbullying, or digital hate (Bozzola et al., 2022; Quandt et al., 2022). Moreover, SN use is related to psychopathological symptoms, feelings of loneliness, higher stress vulnerability, and fear of missing out (Bozzola et al., 2022; Wegmann & Brand, 2019). Besides the negative psychological consequences, itself can be problematic. We provide an overview regarding the historical development of problematic internet and SN use. Thereby, we consider the on-going discussion about problematic internet and SN use as potential addictive behavior.

2. INTRODUCTION OF PROBLEMATIC INTERNET USE AND SN USE WITHIN THE ADDICTION FRAMEWORK

Problematic internet use (PIU) is a complex phenomenon that includes different use of online applications such as gaming, gambling, online-pornography, shopping, and SN (Fineberg et al., 2022). Back in 1996, the researcher and pioneer of the research field Kimberly S. Young reported on a young man, who experienced psychosocial problems due to the excessive use of the internet (Young, 1996). It has been followed by other single and multiple-case studies describing individuals experiencing negative consequences in the context of internet use behavior (Griffiths, 2000) and at almost the same time, Young (1999) described the first symptoms of "internet addiction", which she identified as a potentially clinically relevant disorder. Even though no clear diagnosis or terminology was available, the proximity of problematic, addictive, excessive use of the internet to substance-related disorders was quickly established (see Brand et al., 2014; Spada, 2014).

Theoretical approaches thereby postulate the need of differentiating between unspecified PIU, generalized PIU, and specific forms of problematic online behavior such as gaming, online gambling, online buying/shopping, the use of online sex and pornography applications, social media or SN application, to name only the most prominent ones (e.g., Brand et al., 2014; Dong & Potenza, 2014). Generalized PIU does not differentiate between the problematic use of specific forms of online applications and can be used as an umbrella term for all PIUs (Pan et al., 2020). In addition to the differentiation between specific types of PIU and the partly missing classification, the lack of uniform diagnostic standards and the multitude of terms also posed a challenge. For example, terms such as "excessive internet use", "internet addiction", and "compulsive internet use" were often used synonymously, while more recently the terms PIU and "internet use disorders" are being used increasingly with the classification of (internet) gaming disorder in the DSM-5-TR in Section III and ICD-11 (American Psychiatric Association, 2022; World Health Organization, 2018). There are also numbers of different terms that are generally used synonymously for specific PIU like "problematic social network use (PSNU)", "Facebook addiction", "social media addiction", or "excessive social networks use" (Marino et al., 2021; Miranda et al., 2023), which often makes it difficult to develop a holistic understanding of the terms.

With increasing digitalization and as preferences for different applications vary greatly, it is sometimes challenging to consider PSNU in a general context or to focus on a specific SN application. Abeele et al. (2022) suggest to differentiate between three categories of SN-overuse. The authors illustrate that the problematic use concept is closely linked to disordered, addiction-like use, while the overuse in general could also be associated with impulse-response concepts such as checking habit, distraction, or automatization/contextual overuse for instance as social media fatigue, digital stress, self-control failure, and messaging guilt.

Within the current overview, we focus on the problematic use defined within the addiction framework, even if the term "addiction" should be used with caution (also due to the lack of classification, Cataldo et al., 2022). We advocate the term "problematic social networks use", which is more appropriate for a general problematic behavior. When considering a potential disorder and highlighting the experience of functional impairments, we refer to the term "social network use disorder" in analogy with the definition of gaming disorder in the ICD-11. Thereby, it emphasizes an addiction-like behavior of SN use that arises independently of the respective application used and is based on a perceived loss of control (Wegmann & Brand, 2019).

3. OVERVIEW OF THEORETICAL CONSIDERATIONS OF PIU AND PSNU

There are different approaches and key theoretical frameworks that try to explain and contribute to an understanding of the development and maintenance of generalized PIU and specific PIU. One of the first popular models that attempts to explain PIU is the model by Davis (2001), which focuses on the interplay of personality factors, expectations of internet use, and maladaptive cognitions that promote PIU. It also distinguishes between generalized PIU and specific PIU according to the respective uses (e.g., PSNU). The approach of Brand et al. (2016, 2019) attempts to unify the development and maintenance of the different specific PIUs in one model. The Interaction-of-Person-Affect-Cognition-Execution (I-PACE) model illustrates the interplay of predisposing variables, affective and cognitive mechanisms, as well as reward-related experiences in early and later stages of the addiction process (see also Chapter 5 for further theoretical approaches explaining addictive behaviors). For a distinct view on the development and maintenance of PSNU, Wegmann and Brand (2019) postulate two paths that may affect PSNU, consisting of the *fear-driven/compensation-seeking* hypothesis and the *reward-driven* hypothesis. The fear-driven path refers to predispositions like social anxiety and loneliness and is related to the compensation of fears by using SN. The reward-driven pathway is represented by specific needs (e.g., for self-presentation) or narcissistic personality tendencies, and is related to PSNU in seeking more gratifying experiences and pleasure by using SN.

Depending on an individual's characteristics and expressions of affective and cognitive mechanisms, both paths can lead to PSNU (Wegmann & Brand, 2019).

4. DIAGNOSTIC CRITERIA AND MISSING INCLUSION IN THE CLASSIFICATION SYSTEMS & COMORBIDITIES

In the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), Internet gaming disorder was considered for the first time as a potential mental disorder and included in Section III devoted to "a condition warranting more clinical research and experience" before being recognized as formal disorder. However, the definition is limited to gaming and does not include general internet use or other specific PIUs (American Psychiatric Association, 2022). As part of the publication of the 11th revision of the International Classification of Diseases (ICD-11, World Health Organization), diagnostic criteria were proposed in which gambling and gaming disorder, predominantly online or offline, were recognized as clinical diagnose. In addition, there is discussion about considering specific PIUs, namely problematic online-pornography use, problematic online buying-shopping use and PSNU as "other specified disorders due to addictive behavior" (Brand, 2022; Fineberg et al., 2022). Since then, research has increasingly focused on specific forms of PIU rather than looking at the generalized use of the internet. It targets between common and different characteristics and mechanisms of individual specific PIUs.

The DSM-5 symptom-based assessment defines the following symptom which needs to be fulfilled: *preoccupation, withdrawal, tolerance, inability to reduce, loss of interests in other activities, continuation, deception regarding the amount of usage, escapisms, loss of significant relationships and educational/occupational opportunities*. However, it is also highlighted that the online behavior must cause significant impairments or distress (American Psychiatric Association, 2022). In comparison, the ICD-11 criteria are based on the diagnostic criteria of *impaired control, increased priority, continuation, functional impairment;* and *marked distress*. If the use of specific PIUs leads to distress in daily life due to significant problems with controlling the use of these online applications or the attribution of a higher value than, e.g., personal contacts or work, and resulting in psychological harm, this represents evidence of a specific PIU that should be officially acknowledged (Chen et al., 2020; Wegmann et al., 2021). Considering the debate of recognizing PSNU as a distinct disorder, some researchers refer to similar processes and mechanisms with gaming disorder but at the same time to highlight the research gap in terms of clinical samples, clinical characteristics, and treatment (Brand et al., 2024; Fineberg et al., 2022).

With the increasing digitalization, the diagnostic examination of specific PIUs and PSNU seems to be highly relevant, since the co-occurrence of specific PIUs is assumed. The reasons for this are, on the one hand, technical features that increasingly combine different online behaviors (Pellegrino et al., 2022), but also the similarities in psychological predispositions and risk factors (Munno et al., 2017). Research shows

that individuals with PSNU are at higher risk for problematic online buying-shopping behavior, as they are exposed to a high amount of shopping-related content through one-click shopping or advertising on SN (e.g., Tang & Koh, 2017). When individuals exhibit increased symptom severity of PSNU, the likelihood of mental illness and other maladaptive personality factors also increases; for example, Hussain and Griffiths (2018) found that PSNU co-occurs with mental health disorders like obsessive-compulsive disorder or attention deficit hyperactivity disorder (ADHD). There is also evidence for relationships between PSNU, severity of anxiety, depression (e.g., Wang et al., 2022), eating disorder (Imperatori et al., 2022), and problematic drinking (Russell et al., 2022).

5. PSYCHOLOGICAL MECHANISMS PROMOTING ADDICTION-LIKE USE OF THE INTERNET AND SOCIAL NETWORKS

The consideration of psychological mechanisms and theoretical processes is necessary to understand why individuals engage in specific PIU despite negative consequences. Theoretical approaches discuss the impact of predisposing variables and underlying mechanisms such as affective and cognitive components, and reward-related components (see Brand et al., 2019; Dong & Potenza, 2014; Wegmann & Brand, 2019).

5.1 Predisposing Variables

Drawing conclusions about cause-effect relationships for PIU and PSNU is difficult due to the novelty of the potential addictive behaviors, as many studies are often cross-sectional and based on correlative examinations. Nevertheless, theoretical models have suggested certain predisposing factors and susceptibility factors for PIU and PSNU. These factors do not always have to be distinguished between PIU and PSNU, as they often overlap and are by no means gradual. However, there are divergent and specific characteristics of SN that are crucial for the development of PSNU.

5.1.1 *Sociodemographic factors*

On a sociodemographic level, male sex, attending a vocational school and an unhappy childhood were identified as predisposing variables for PIU (Munno et al., 2017). While PIU tends to be prevalent in all age groups, previous empirical studies have found that PSNU tends to affect younger age groups. It is also assumed that it is more likely to affect the female sex (Bouna-Pyrrou et al., 2018); however, a trend towards a more balanced gender distribution can be observed within the last years (Brailovskaia et al., 2023).

5.1.2 *Social factors*

Conflicts in personal life and a lack of social support was shown in both PIU and PSNU, whereas with SN use, the compensation of social needs can be more fulfilled than by other online behaviors (e.g., online shopping; Bouffard et al., 2022).

5.1.3 *Psychological and Personality factors*

For both PIU and PSNU, increased self-esteem is very well established as a predisposing factor, but for PSNU, there is probably the greatest opportunity for self-presentation on SN, which can promote the problematic behavior with an active intent to use. Nonetheless, also a low self-esteem is shown to impact PSNU (Liu & Baumeister, 2016). In a systematic review, D'Arienzo et al. (2019) summarized that those individuals with a PSNU displayed a high insecure attachment predisposition. Reasons mentioned are replacing and compensating for the affection that is missing from offline contacts. Moreover, various dimensions of the psychotic area (e.g., schizophrenia or paranoia) and anxiety were described as predisposing variables for PIU (Munno et al., 2017). A recent meta-analysis by Du et al. (2024) also identified multiple anxiety subtypes and fear of missing out to be predominant in PSNU. For both PIU and PSNU, it appears that impulsivity is an important predictor. For PSNU, ADHD symptoms including hyperactivity and impulsivity occur particularly frequently with a higher symptom severity (Boer et al., 2020).

5.1.4 *Needs and motives*

Empirical studies on PIUs show that the motives and needs that drive individuals to use the internet are escapism, entertainment, information search, and coping with negative feelings (Bischof-Kastner et al., 2014; Wong et al., 2014). Regarding PSNU, Kircaburun et al. (2020) found that self-expression is an important motive, which was supplemented by the aspects of passing time and meeting new people. Different motives for different platforms were also identified. While women, for example, tend to use SN for reasons of self-expression, it was found that socializing aspects play a greater role for men (Kircaburun et al., 2020). It was also concluded that there are different motives for the frequency and duration of use (Wadsley & Ihssen, 2022). While frequency of SN use is more associated with the desire for social reward and enjoyment, intrinsic motivation for self-expression is a relevant factor in the length of use.

5.2 Affective and cognitive components

During the process of developing addiction-like behaviors, a sensitivity to application-related stimuli develops, which in turn can trigger craving for behavioral enactment or use (Robinson & Berridge, 1993). Increased cue reactivity and increased craving for SN-related stimuli was prevalent in PSNU (Moretta & Buodo, 2021; Wegmann et al., 2018). Deficits in inhibitory control and decision making are associated with PIU (Ioannidis et al., 2022).

In PSNU, studies show that difficulties in executive functioning can be seen as a predisposing factor for PSNU (Müller et al., 2021). Cognitive functioning was found to be impaired by PSNU as some preliminary event-related potentials (ERP) studies show evidence for an inefficiency in allocating and monitoring resources and inhibitory control (Weinstein, 2022). The impairments in cognitive control can result in the inefficiency in allocating and monitoring resources, inhibitory control, and increased impulsivity

(He et al., 2017). Nevertheless, the results on various implicit cognitions in PSNU are very limited and heterogeneous in terms of their manifestation and methodological investigations but allow the assumption that they could be just as relevant in PSNU as in PIU (Kessling et al., 2023).

5.3 Reward-related components

The mechanisms behind PIU and PSNU are often reward-oriented and go hand in hand with specific expectations and experiences that depend on psychosocial characteristics and can also vary across different platforms due to different technical features (Meshi et al., 2020). Empirical findings emphasized that PIU and PSNU are related with higher positive use expectancies as well as avoidance expectancies (Brand et al., 2014; Wegmann & Brand, 2019). Individuals with PIU have a cognitive belief that internet use will induce satisfying feelings (e.g., pleasure gain), which can lead to either the development of higher reward sensitivity, problems with delaying rewards, or an increased urge for immediate positive reinforcement of feelings from using online applications (W. He et al., 2017). In line with this, empirical studies illustrate that PSNU is associated with higher experiences of gratification and experiences of compensation due to the use of SN (Wegmann et al., 2022; Wegmann et al., 2025).

5.4. Consequences

Initial longitudinal studies suggest that PIU and PSNU lead to psychological distress (Chen et al., 2020) and insomnia (Lin et al., 2021), while PSNU, furthermore, leads to nomophobia (the anxiety to be separated from the smartphone). In addition, increased emotional and intrusive consequences (Ferris et al., 2021), significant negative impact on self-esteem (due to reasons like self-comparison) and a dysmorphic body image (Ryding & Kuss, 2020) was shown as consequences of PSNU. Although there are many similarities, each specific PIU has its own unique characteristics that apply to the respective usage behavior and the people affected by it. The empirical results therefore underline the need to consider both phenomena individually and address them in a targeted manner.

6. IMPLICATIONS FOR PREVENTION, INTERVENTION, AND TREATMENT

Considering addictive behaviors in general, current empirical studies and systematic review articles illustrate that cognitive behavioral therapy (CBT) seems to be the most promising approach for treatment (see Wegmann et al., 2024). Focusing on adolescents with PIU, Szasz-Janocha et al. (2020) illustrate the long-term effectiveness of a manual-based CBT treatment on symptom severity and negative psychological outcome variables (e.g., depression and anxiety). Further systematic overviews show the

importance for prevention programs by enhancing abilities such as adaptive coping strategies, strategies of self-control, internet literacy, as well as support of social relationships (Basenach et al., 2023; King et al., 2018). Most reviews mainly focus on PIU in general or gaming disorder. Regarding the effectiveness of CBT in PSNU there are only single-case studies, which illustrate that this treatment approach might be fruitful. It seems to be promising to additionally address strategies of emotion regulation, cognitive bias modification, and the elaboration of alternative, rewarding behaviors (Hou et al., 2019; Lan et al., 2018; Turel & Cavagnoro, 2019; Zhou et al., 2021). The results, nevertheless, only provide a first insight since clinical trial studies are scarce so far and highly needed (see also Brand et al., 2024).

In addition, addressing problems associated with PSNU is another important factor in dealing with problematic use. Improving body image and sleep quality, experiencing alternative behavioral strategies, or dealing with meta-cognitive strategies have been outlined as possible preventive measures against problematic use (Bozzola et al., 2022; Casale et al., 2021; Marino et al., 2018). In general, psychoeducational approaches alongside standardized CBT approaches and brief interventions should be implemented, although the evidence, particularly for PSNU, is still vague, and clinical and long-term studies are needed.

7. CONCLUSION AND RECOMMENDATIONS FOR FUTURE RESEARCH

We aim to provide an overview regarding the current state of the art of unspecified PIU as well as of PSNU as potential addictive behaviors. Thereby, we reflect on the current debate regarding recognition as a possible disorder against the background of empirical evidence, but also to highlight the gaps in research. From a historical point of view, the consideration of internet and SN use as addictive behavior have resulted in the modification of previous theoretical approaches for the online behavior and the development of new theoretical discussions. This led to the discussion of (internet) gaming disorder in the DSM-5 in Section III and the inclusion of gaming and gambling disorders as disorders due to addictive behaviors in the ICD-11. The theoretical frameworks also provided —and still should provide— the basis for empirical research aiming to obtain a better understanding of underlying mechanisms of the development and maintenance of an unspecified PIU in general or a PSNU. While in the past the focus of empirical research has often been on non-specific PIU, researchers are increasingly postulating to concentrate on specific PIUs, such as PSNU. This is empirically supported by studies showing that specific PIUs appear to be distinct but related entities (Baggio et al., 2022, 2024), where the focus should be on the activity itself and not a general overuse or the specific device (e.g., smartphone addiction). Concurrently, the increasing (technical) convergences between the various internet applications must also be

considered in research, which for example raises the question of possible transitions from one disorder or use to the next (Brand et al., 2024).

Empirical findings highlight psychopathology, social exclusion, stress vulnerability, and unfulfilled needs are key factors for PSNU. There are also common convergent mechanisms such as the relevance of cue reactivity, craving, and use expectancies as well as rewarding experiences, comparable with other specific PIUs or substance-related disorders. At the same time, it is also important to identify specific research gaps. There is a lack of consistent findings on the significance of implicit and explicit cognitions, there is a lack of studies on clinical characteristics and clinical samples, and there is a lack of studies on the relevance of application-specific characteristics promoting problematic SN use —to name just a few examples.

Furthermore, it would be desirable to derive SN-specific prevention, intervention, and (potential) treatment approaches (e.g., Romero Saletti & Van den Broucke, 2024). This would also require a better understanding of the effects of problematic use in everyday life, including the question of whether and in what way diagnostic criteria such as significant impairments and marked distress are experienced. To achieve this understanding, we call for the continuation of theory- and hypotheses-based research on the one hand, but also for a methodological variety. This variety should include a broader definition of usage behavior considering application-specific features, type of usage behavior, and potential associations with the behavior and the application. It also includes a variety of study designs (e.g., ecological momentary assessment for real-life data, longitudinal approaches, experimental settings, physiological measurements) which all could be fruitful besides behavioral data and self-reports (Bennett et al., 2020; Gansner et al., 2020; Wadsley & Ihssen, 2023).

In addition, previous research must now be transferred to a clinical setting. We feel that this is a promising approach to understand why some individuals experience negative consequences from using the internet and SN and others do not, and rather can take advantage of the positive aspects of the media.

REFERENCES

Abeele, M. M. V., Halfmann, A., & Lee, E. W. (2022). Drug, demon, or donut? Theorizing the relationship between social media use, digital well-being and digital disconnection. *Current Opinion in Psychology*, *45*(101295). https://doi.org/10.1016/j.copsyc.2021.12.007

Allen, K. A., Ryan, T., Gray, D. L., Mclnerney, D. M., & Waters, L. (2014). Social media use and social connectedness in adolescents: The positives and the potential pitfalls. *The Educational and Developmental Psychologist*, *31*(1), 18-31. https://doi.org/10.1017/edp.2014.2

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.; DSM-5-TR). American Psychiatric Publishing.

Baggio, S., Bosson, M., Berle, D., Starcevic, V., Simon, O., & Billieux, J. (2024). Problematic online behaviors constitute related yet distinct conditions: A cross-sectional study. *Computers in Human Behavior, 160*, 108358. https://doi.org/10.1016/j.chb.2024.108358

Baggio, S., Starcevic, V., Billieux, J., King, D. L., Gainsbury, S. M., Eslick, G. D., & Berle, D. (2022). Testing the spectrum hypothesis of problematic online behaviors: A network analysis approach. *Addictive Behaviors, 135*, 107451. https://doi.org/10.1016/j.addbeh.2022.107451

Basenach, L., Renneberg, B., Salbach, H., Dreier, M., & Wölfling, K. (2023). Systematic reviews and meta-analyses of treatment interventions for Internet use disorders: Critical analysis of the methodical quality according to the PRISMA guidelines. *Journal of Behavioral Addictions*, *12*(1), 9-25. https://doi.org/10.1556/2006.2022.00087

Bennett, B. L., Whisenhunt, B. L., Hudson, D. L., Wagner, A. F., Latner, J. D., Stefano, E. C., & Beauchamp, M. T. (2020). Examining the impact of social media on mood and body dissatisfaction using ecological momentary assessment. *Journal of American College Health*, *68*(5), 502-508. https://doi.org/10.1080/07448481.2019.1583236

Bischof-Kastner, C., Kuntsche, E., & Wolstein, J. (2014). Identifying problematic Internet users: development and validation of the Internet Motive Questionnaire for Adolescents (IMQ-A). *Journal of Medical Internet Research*, *16*(10), e230. https://doi.org/10.2196/jmir.3398

Boer, M., Stevens, G., Finkenauer, C., & van den Eijnden, R. (2020). Attention Deficit Hyperactivity Disorder-Symptoms, social media use intensity, and social media use problems in adolescents: Investigating directionality. *Child Development*, *91*(4), e853-e865. https://doi.org/10.1111/cdev.13334

Bouffard, S., Giglio, D., & Zheng, Z. (2022). Social media and romantic relationship: Excessive social media use leads to relationship conflicts, negative outcomes, and addiction via mediated pathways. *Social Science Computer Review*, *40*(6), 1523-1541. https://doi.org/10.1177/08944393211013356

Bouna-Pyrrou, P., Aufleger, B., Braun, S., Gattnar, M., Kallmayer, S., Wagner, H., Kornhuber, J., Muhle, C., & Lenz, B. (2018). Cross-sectional and longitudinal evaluation of the social network use disorder and internet gaming disorder criteria. *Frontiers in Psychiatry*, *9*, 692. https://doi.org/10.3389/fpsyt.2018.00692

Bozzola, E., Spina, G., Agostiniani, R., Barni, S., Russo, R., Scarpato, E., Di Mauro, A., Di Stefano, A. V., Caruso, C., Corsello, G., & Staiano, A. (2022). The use of social media in children and adolescents: Scoping review on the potential risks. *International Journal of Environmental Research and Public Health*, *19*(16). https://doi.org/10.3390/ijerph19169960

Brailovskaia, J., Ozimek, P., Rohmann, E., & Bierhoff, H. W. (2023). Vulnerable narcissism, fear of missing out (FoMO) and addictive social media use: A gender comparison from Germany. *Computers in Human Behavior*, *144*, 107725. https://doi.org/10.1016/j.chb.2023.107725

Brand, M. (2022). Can internet use become addictive? *Science*, *376*(6595), 798-799. https://doi.org/10.1126/science.abn4189

Brand, M., Antons, S., Bőthe, B., Demetrovics, Z., Fineberg, N. A., Jimenez-Murcia, S., King, D. L., Mestre-Bach, G., Moretta, T., Müller, A., Wegmann, E., & Potenza, M. N. (2024). Current advances in behavioral addictions: From fundamental research to clinical practice. *American Journal of Psychiatry*. https://doi.org/10.1176/appi.ajp.20240092

Brand, M., Wegmann, E., Stark, R., Muller, A., Wolfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience & Biobehavioral Reviews*, *104*, 1-10. https://doi.org/10.1016/j.neubiorev.2019.06.032

Brand, M., Young, K. S., & Laier, C. (2014). Prefrontal control and internet addiction: a theoretical model and review of neuropsychological and neuroimaging findings. *Frontiers in Human Neuroscience*, *8*, 375. https://doi.org/10.3389/fnhum.2014.00375

Brand, M., Young, K. S., Laier, C., Wolfling, K., & Potenza, M. N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience & Biobehavioral Reviews*, *71*, 252-266. https://doi.org/10.1016/j.neubiorev.2016.08.033

Carr, C. T., & Hayes, R. A. (2015). Social media: Defining, developing, and divining. *Atlantic Journal of Communication*, *23*(1), 46-65. https://doi.org/10.1080/15456870.2015.972282

Casale, S., & Fioravanti, G. (2015). Satisfying needs through Social Networking Sites: A pathway towards problematic Internet use for socially anxious people? *Addictive Behaviors Reports*, *1*, 34-39. https://doi.org/10.1016/j.abrep.2015.03.008

Casale, S., Musico, A., & Spada, M. M. (2021). A systematic review of metacognitions in Internet Gaming Disorder and problematic Internet, smartphone and social networking sites use. *Clinical Psychology & Psychotherapy*, *28*(6), 1494-1508. https://doi.org/10.1002/cpp.2588

Cataldo, I., Billieux, J., Esposito, G., & Corazza, O. (2022). Assessing problematic use of social media: Where do we stand and what can be improved? *Current Opinion in Behavioral Sciences*, *45*(101145). https://doi.org/10.1016/j.cobeha.2022.10114

Chen, I. H., Pakpour, A. H., Leung, H., Potenza, M. N., Su, J. A., Lin, C. Y., & Griffiths, M. D. (2020). Comparing generalized and specific problematic smartphone/internet use: Longitudinal relationships between smartphone application-based addiction and social media addiction and psychological distress. *Journal of Behavioral Addictions*, *9*(2), 410-419. https://doi.org/10.1556/2006.2020.00023

D'Arienzo, M. C., Boursier, V., & Griffiths, M. D. (2019). Addiction to social media and attachment styles: A systematic literature review. *International Journal of Mental Health and Addiction*, *17*, 1094-1118. https://doi.org/10.1007/s11469-019-00082-5

Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior*, *14*(2), 187-195. https://doi.org/10.1016/S0747-5632(00)00041-8

Dong, G., & Potenza, M. N. (2014). A cognitive-behavioral model of Internet gaming disorder: Theoretical underpinnings and clinical implications. *Journal of Psychiatric Research*, *58*, 7-11. https://doi.org/10.1016/j.jpsychires.2014.07.005

Du, M., Zhao, C., Hu, H., Ding, N., He, J., Tian, W., Zhao, W., Lin, X., Liu, G., Chen, W., Wang, S., Wang, P., Xu, D., Shen, X., & Zhang, G. (2024). Association between problematic social networking use and anxiety symptoms: A systematic review and meta-analysis. *BMC Psychology*, *12*(1), 263. https://doi.org/10.1186/s40359-024-01705-w

Ferris, A. L., Hollenbaugh, E. E., & Sommer, P. A. (2021). Applying the uses and gratifications model to examine consequences of social media addiction. *Social Media+ Society*, *7*(2). https://doi.org/10.1177/2056305121101900

Fineberg, N. A., Menchon, J. M., Hall, N., Dell'Osso, B., Brand, M., Potenza, M. N.,

Chamberlain, S. R., Cirnigliaro, G., Lochner, C., Billieux, J., Demetrovics, Z., Rumpf, H. J., Muller, A., Castro-Calvo, J., Hollander, E., Burkauskas, J., Grunblatt, E., Walitza, S., Corazza, O., . . . Zohar, J. (2022). Advances in problematic usage of the internet research - A narrative review by experts from the European network for problematic usage of the internet. *Comprehensive Psychiatry*, *118*, 152346. https://doi.org/10.1016/j.comppsych.2022.152346

Gansner, M., Nisenson, M., Carson, N., & Torous, J. (2020). A pilot study using ecological momentary assessment via smartphone application to identify adolescent problematic internet use. *Psychiatry Research*, *293*, 113428. https://doi.org/10.1016/j.psychres.2020.113428

Griffiths, M. (2000). Does Internet and computer" addiction" exist? Some case study evidence. *CyberPsychology and Behavior*, *3*(2), 211-218. https://doi.org/10.1089/109493100316067

He, Q., Turel, O., & Bechara, A. (2017). Brain anatomy alterations associated with Social Networking Site (SNS) addiction. *Scientific Reports*, *7*, 45064. https://doi.org/10.1038/srep45064

He, W., Qi, A., Wang, Q., Wu, H., Zhang, Z., Gu, R., & Luo, W. (2017). Abnormal reward and punishment sensitivity associated with Internet addicts. *Computers in Human Behavior*, *75*, 678-683.

Hou, Y., Xiong, D., Jiang, T., Song, L., & Wang, Q. (2019). Social media addiction: Its impact, mediation, and intervention. Cyberpsychology. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *13*(1). https://doi.org/10.5817/CP2019-1-4

Hussain, Z., & Griffiths, M. D. (2018). Problematic social networking site use and comorbid psychiatric disorders: A Systematic review of recent large-scale studies. *Frontiers in Psychiatry*, *9*, 686. https://doi.org/10.3389/fpsyt.2018.00686

Imperatori, C., Panno, A., Carbone, G. A., Corazza, O., Taddei, I., Bernabei, L., Massullo, C., Prevete, E., Tarsitani, L., Pasquini, M., Farina, B., Biondi, M., & Bersani, F. S. (2022). The association between social media addiction and eating disturbances is mediated by muscle dysmorphia-related symptoms: A cross-sectional study in a sample of young adults. *Eating and Weight Disorder*, *27*(3), 1131-1140. https://doi.org/10.1007/s40519-021-01232-2

Ioannidis, K., Grant, J. E., & Chamberlain, S. R. (2022). Problematic usage of the internet and cognition. *Current Opinion in Behavioral Sciences*, *44*(101104). https://doi.org/10.1016/j.cobeha.2022.101104

Katz, E., Blumer, J. G., & Gurevitch, M. (1973). Uses and gratifications research. *The Public Opinion Quarterly*, *37*(4), 509-523.

Kessling, A., Schmidt, L. D., Brand, M., & Wegmann, E. (2023). Implicit cognitions in problematic social network use. *Journal of Behavioral Addictions*, *12*(3), 590-598. https://doi.org/10.1556/2006.2023.00035

King, D. L., Delfabbro, P. H., Doh, Y. Y., Wu, A. M. S., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2018). Policy and prevention approaches for disordered and hazardous gaming and internet use: An international perspective. *Prevention Science*, *19*(2), 233-249. https://doi.org/10.1007/s11121-017-0813-1

Kircaburun, K., Alhabash, S., Tosuntas, S. B., & Griffiths, M. D. (2020). Uses and gratifications of problematic social media use among university students: A simultaneous examination of the Big Five of personality traits, social media platforms, and social media use motives. *International Journal of Mental Health and Addiction*, *18*, 525-547. https://doi.org/10.1007/s11469-018-9940-6

Lan, Y., Ding, J. E., Li, W., Li, J., Zhang, Y., Liu, M., & Fu, H. (2018). A pilot study of a group mindfulness-based cognitive-behavioral intervention for smartphone addiction among university students. *Journal of Behavioral Addictions*, *7*(4), 1171-1176. https://doi.org/10.1556/2006.7.2018.103

Lazarus, R. S., & Folkman, S. (1984). Stress, Appraisal, Coping. *Springer*.

Lin, C. Y., Potenza, M. N., Ulander, M., Broström, A., Ohayon, M. M., Chattu, V. K., & Pakpour, A. H. (2021). Longitudinal relationships between nomophobia, addictive use of

social media, and insomnia in adolescents. *Healthcare*, *9*(9). https://doi.org/10.3390/healthcare9091201

Liu, D., & Baumeister, R. F. (2016). Social networking online and personality of self-worth: A meta-analysis. *Journal of Research in Personality*, *64*, 79-89. https://doi.org/10.1016/j.jrp.2016.06.02

Marino, C., Canale, N., Melodia, F., Spada, M. M., & Vieno, A. (2021). The overlap between problematic smartphone use and problematic social media use: A systematic review. *Current Addiction Reports, 1,* 1-12.

Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2018). The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders*, *226*, 274-281. https://doi.org/10.1016/j.jad.2017.10.007

Meier, A., & Reinecke, L. (2020). Computer-mediated communication, social media, and mental health: A conceptual and empirical meta-review. *Communication Research*, *48*(8), 1182-1209. https://doi.org/10.1177/0093650220958224

Meshi, D., Turel, O., & Henley, D. (2020). Snapchat vs. Facebook: Differences in problematic use, behavior change attempts, and trait social reward preferences. *Addictive Behavior Reports*, *12*, 100294. https://doi.org/10.1016/j.abrep.2020.100294

Miranda, S., Trigo, I., Rodrigues, R., & Duarte, M. (2023). Addiction to social networking sites: Motivations, flow, and sense of belonging at the root of addiction. *Technological Forecasting and Social Change*, 188.

Moretta, T., & Buodo, G. (2021). Motivated attention to stimuli related to social networking sites: A cue-reactivity study. *Journal of Behavioral Addictions*, *10*(2), 314-326. https://doi.org/10.1556/2006.2021.00040

Müller, S. M., Wegmann, E., Garcia Arias, M., Bernabeu Brotons, E., Marchena Giraldez, C., & Brand, M. (2021). Deficits in executive functions but not in decision making under risk in individuals with problematic social-network use. *Comprehensive Psychiatry*, *106*, 152228. https://doi.org/10.1016/j.comppsych.2021.152228

Munno, D., Cappellin, F., Saroldi, M., Bechon, E., Guglielmucci, F., Passera, R., & Zullo, G. (2017). Internet addiction disorder: Personality characteristics and risk of pathological overuse in adolescents. *Psychiatry Research*, *248*, 1-5. https://doi.org/10.1016/j.psychres.2016.11.008

Nadkarni, A., & Hofmann, S. G. (2012). Why do people use Facebook? *Personality and Individual Differences*, *52*(3), 243-249. https://doi.org/10.1016/j.paid.2011.11.007

Odgers, C. L., & Jensen, M. R. (2020). Annual research review: Adolescent mental health in the digital age: Facts, fears, and future directions. *Journal of Child Psychology Psychiatry*, *61*(3), 336-348. https://doi.org/10.1111/jcpp.13190

Orben, A., & Blakemore, S. J. (2023). How social media affects teen mental health: A missing link. *Nature*, *614*(7946), 410-412.

Organization, W. H. (2018). International classification of diseases for mortality and morbidity statistics (11th Revision). https://icd.who.int/browse11/l-m/en

Pan, Y. C., Chiu, Y. C., & Lin, Y. H. (2020). Systematic review and meta-analysis of epidemiology of internet addiction. *Neuroscience & Biobehavior Reviews*, *118*, 612-622. https://doi.org/10.1016/j.neubiorev.2020.08.013

Pellegrino, A., Abe, M., & Shannon, R. (2022). The dark side of social media: Content effects on the relationship between materialism and consumption behaviors. *Frontiers in Psychology*, *13*, 870614. https://doi.org/10.3389/fpsyg.2022.870614

Pouwels, J. L., Keijsers, L., & Odgers, C. (2022). Who benefits most from using social media, the socially rich or the socially poor? *Current Opinion in Psychology*, *47*, 101351. https://doi.org/10.1016/j.copsyc.2022.101351

Printstein, M. J., Nesi, J., & Telzer, E. H. (2020). Commentary: An updated agenda for the study of digital media use and adolescent development–future directions following Odgers & Jensen (2020). *Journal of Child Psychology and Psychiatry*, *61*(3), 349-352. https://doi.org/10.1111/jcpp.13219

Quandt, T., Klapproth, J., & Frischlich, L. (2022). Dark social media participation and well-being. *Current Opinion in Psychology*, *45*, 101284. https://doi.org/10.1016/j.copsyc.2021.11.004

Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: An incentive-sensitization theory of addiction. *Brain Research reviews*, *18*(3), 247-291. https://doi.org/10.1016/0165-0173(93)90013-p

Romero Saletti, S. M., & Van den Broucke, S. (2024). Focusing the attention on what truly matters. Preventive approaches for problematic Instagram use in youth. *Current Addiction Reports, 11*(4), 724-735. https://doi.org/10.1007/s40429-024-00576-w

Russell, A. M., Vest, N. A., & Litt, D. M. (2022). Social networking site use and alcohol use behaviors among adolescents: A latent profile analysis. *Addictive Behaviors*, *129*, 107261. https://doi.org/10.1016/j.addbeh.2022.107261

Ryding, F. C., & Kuss, D. J. (2020). The use of social networking sites, body image dissatisfaction, and body dysmorphic disorder: A systematic review of psychological research. *Psychology of Popular Media*, *9*(4), 412. https://doi.org/10.1037/ppm0000264

Schemer, C., Masur, P. K., Geiß, S., Müller, P., & Schäfer, S. (2021). The impact of internet and social media use on well-being: A longitudinal analysis of adolescents across nine years. *Journal of Computer-Mediated Communication*, *26*(1), 1-21. https://doi.org/10.1093/jcmc/zmaa014

Spada, M. M. (2014). An overview of problematic internet use. *Addictive Behaviors*, *39*(1), 3-6. https://doi.org/10.1016/j.addbeh.2013.09.007

Statista. (2024a). https://www.statista.com/topics/1145/internet-usage-worldwide/#topicOverview

Statista. (2024b). https://www.statista.com/topics/779/mobile-internet/#topicOverview

Statista. (2024c). https://www.statista.com/topics/1164/social-networks/#topicOverview

Szasz-Janocha, C., Vonderlin, E., & Lindenberg, K. (2020). Treatment outcomes of a CBT-based group intervention for adolescents with Internet use disorders. *Journal of Behavioral Addictions*, *9*(4), 978-989. https://doi.org/10.1556/2006.2020.00089

Tang, C. S., & Koh, Y. Y. (2017). Online social networking addiction among college students in Singapore: Comorbidity with behavioral addiction and affective disorder. *Asian Journal of Psychiatry*, *25*, 175-178. https://doi.org/10.1016/j.ajp.2016.10.027

Turel, O., & Cavagnoro, D. R. (2019). Effect of abstinence from social media on time perception: Differences between low-and at-risk for social media "addiction" groups. *Psychiatric Quarterly*, *90*(1), 217-227. https://doi.org/10.1007/s11126-018-9614-3

Valkenburg, P. M., & Peter, J. (2007). Preadolescents' and adolescents' online communication and their closeness to friends. *Developmental Psychology*, *43*(2), 267-277. https://doi.org/10.1037/0012-1649.43.2.267

Wadsley, M., Covey, J., & Ihssen, N. (2022). The predictive utility of reward-based motives underlying excessive and problematic social networking site use. *Psychological Reports*, *125*(5), 2485-2516. https://doi.org/10.1177/00332941211025271

Wadsley, M., & Ihssen, N. (2022). The roles of implicit approach motivation and explicit reward in excessive and problematic use of social networking sites. *PLoS One*, *17*(3), e0264738. https://doi.org/10.1371/journal.pone.0264738

Wadsley, M., & Ihssen, N. (2023). Restricting social networking site use for one week produces varied effects on mood but does not increase explicit or implicit desires to use SNSs: Findings from an ecological momentary assessment study. *PLoS One*, *18*(11). https://doi.org/10.1371/journal.pone.0293467

Wang, Z., Yang, H., & Elhai, J. D. (2022). Are there gender differences in comorbidity symptoms networks of problematic social media use, anxiety and depression symptoms? Evidence from network analysis. *Personality and Individual Differences*, *195*. https://doi.org/10.1016/j.paid.2022.111705

Wegmann, E., Antons, S., & Brand, M. (2022). The experience of gratification and compensation in addictive behaviors: How can

these experiences be measured systematically within and across disorders due to addictive behaviors? *Comprehensive Psychiatry*, *117*, 152336. https://doi.org/10.1016/j.comppsych.2022.152336

Wegmann, E., Antons, S., Müller, S. M., & Brand, M. (2024). Onlinebezogene Verhaltenssüchte auf dem Prüfstand: Was wissen wir aus (neuro-)psychologischer Sicht. *neuro aktuell*, *6*(38), 25-31.

Wegmann, E., Antons, S., Schmidt, L. D., Klein, L., Montag, C., Rumpf, H.-J., Müller, S. M., & Brand, M. (2025). Feels good, and less bad: Problematic use of the Internet is associated with heightened experiences of both gratification and compensation. *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2024.00067

Wegmann, E., & Brand, M. (2019). A narrative overview about psychosocial characteristics as risk factors of a problematic social networks use. *Current Addiction Reports*, *6*, 402-409. https://doi.org/10.1007/s40429-019-00286-8

Wegmann, E., Muller, S. M., Trotzke, P., & Brand, M. (2021). Social-networks-related stimuli interferes decision making under ambiguity: Interactions with cue-induced craving and problematic social-networks use. *Journal of Behavioral Addictions*, *10*(2), 291-301. https://doi.org/10.1556/2006.2021.00036

Wegmann, E., Ostendorf, S., & Brand, M. (2018). Is it beneficial to use Internet-communication for escaping from boredom? Boredom proneness interacts with cue-induced craving and avoidance expectancies in explaining symptoms of Internet-communication disorder. *PLoS One*, *13*(4), e0195742. https://doi.org/10.1371/journal.pone.0195742

Wegmann, E., Schiebener, J., & Brand, M. (2023). Social-networks use as adaptive or maladaptive strategy for coping with stress. *Scientific Reports*, *13*(1), 11895. https://doi.org/10.1038/s41598-023-39042-4

Weinstein, A. M. (2022). Problematic social networking site use-effects on mental health and the brain. *Frontiers in Psychiatry*, *13*, 1106004. https://doi.org/10.3389/fpsyt.2022.1106004

Wolfers, L. N., & Utz, S. (2022). Social media use, stress, and coping. *Current Opinion in Psychology*, *45*(101305). https://doi.org/10.1016/j.copsyc.2022.101305

Wong, T. Y., Yuen, K. S., & Li, W. O. (2014). A basic need theory approach to problematic Internet use and the mediating effect of psychological distress. *Frontiers in Psychology*, *5*, 1562. https://doi.org/10.3389/fpsyg.2014.01562

Young, K. S. (1996). Psychology of computer use: XL. Addictive use of the Internet: A case that breaks the stereotype. *Psychological reports*, *79*(3), 899-902. https://doi.org/10.2466/pro.1996.79.3.899

Young, K. S. (1999). Internet addiction: Evaluation and treatment. *BMJ*, *319*. https://doi.org/10.1136/sbmj.9910351

Zhou, X., Rau, P. P., Yang, C. L., & Zhou, X. (2021). Cognitive behavioral therapy-based short-term abstinence intervention for problematic social media use: Improved well-being and underlying mechanisms. *Psychiatric Quarterly*, *92*(2), 761-779. https://doi.org/10.1007/s11126-020-09852-0

II

UNDERSTANDING

8

UNDERSTANDING PROBLEMATIC GAMING IN YOUNG PEOPLE AND AVOID MAKING IT WORSE

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ABSTRACT:

Videogames have become an integral part of contemporary life, enriching traditional forms of socialization and play rather than displacing them. Yet, for a minority of individuals, gaming disrupts relationships, educational or work commitments, and overall well-being. This chapter critically explores whether problematic gaming among young people emerges as a maladaptive coping mechanism for underlying distress or constitutes an independent source of dysfunction. We delve into the societal and psychological roles of gaming, drawing a critical distinction between healthy passion and problematic engagement. Special focus is given to the psychological functions gaming serves, the influence of psychological vulnerabilities, and the specific circumstances that may predispose individuals to gaming-related problems. The chapter concludes by addressing common responses from caregivers and others close to affected individuals, advocating for empathetic and informed approaches, and encouraging acknowledgment of the severity while avoiding making it worse. Finally, we propose a framework for understanding problematic gaming and practical strategies to support young people overinvolved with videogames and their families, fostering healthier and more balanced interactions with virtual environments.

KEYWORDS:

gaming disorder, hikikomori, videogames, passion, compensation

1. INTRODUCTION

Since the dawn of human history, spaces for socialization and play have been deeply rooted in physical presence, engaging all five senses. To interact with others, individuals underwent a process of preparing their bodies for presentation to others, an act that underscored the importance of physical proximity in fostering a sense of belonging. Community was intrinsically tied to the places where individuals felt most at home. Life moved at a slower pace, and the absence of a constant need for connectivity allowed people to experience solitude as truly solitary, while time with others was shared exclusively with them. This balance was disrupted with the advent of the internet and virtual communication, which transformed the world into a faster, lighter, and more immaterial experiential domain (Baricco, 2018). The constant availability brought about by digital connectivity elevated expectations, altered perceptions of loneliness, and blurred the lines between time and space. This acceleration has necessitated greater efforts to align body and mind in the "here and now." But what underpins these profound changes?

Prior to the internet, access to knowledge —and the autonomy, power, and responsibility that accompanied it— was limited. Attaining information and its associated social capital required individuals to navigate lengthy processes of learning and evaluation, typically under the guidance of a select few deemed custodians of that knowledge. Although this hierarchical structure persists in many educational systems, the rise of the internet has significantly diminished the verticality of power dynamics in numerous domains, fostering a shift toward greater horizontality. In education, for instance, this has led to a transition from the traditional "one-to-many" dissemination of knowledge to a model emphasizing shared creation. Concurrently, the dominance of written language has given way to the primacy of images, marking a shift from knowledge acquisition through reading selected contents to one based on navigation and exploration. This transformation has replaced learning through absorption and introspection with a mode

of learning rooted in externalization of research and, notably, skill acquisition through play (Veen & Vrakking, 2006).

The technological revolution has brought about profound transformations in the affective cultures of families. Infant research (Bretherton, 2013), for example, reveals that contemporary views increasingly regard babies as socially oriented even before birth. This implies that entry into society is now accompanied by an "invitation" to express oneself and gain recognition from others. This perspective represents a marked departure from the earlier paradigm, in which children were considered blank sheets to be inscribed with the norms of a specific social group. In earlier models of development, the implicit social contract required individuals to trade personal freedom for security and belonging (Spiniello, Piotti & Comazzi, 2015).

In alignment with this shift, the dominant mechanism of social regulation has also evolved. Guilt, traditionally linked to the presence of an internal or external authority figure as a mediating force, has given way to shame, a dynamic more commonly shaped by judgment of peers (McWilliams, 2011) and feelings of inadequacy with respect to others (Schimmenti, 2022). Broadening this perspective, one might attribute this change in mental posture to the technological revolution itself. Yet, as Baricco (2018) suggests, the opposite may hold true: the technological revolution might be better understood as the offspring —or at most, the sibling— of a deeper mental insurgency that has unfolded over the past three decades.

The internet, at its inception, aimed to democratize knowledge by granting individuals greater autonomy and reducing reliance on a powerful intermediary. However, this endeavor has paradoxically led to the rise of new "big players" on the market. While individuals now enjoy expanded agency and reach, they are also more susceptible to surveillance and external control. For parents, this dynamic is particularly significant: monitoring children from afar has become a possibility, which has turned into a necessity.

In this regard, adolescence should be considered as a developmental stage marked by the need for spaces where individuals can assert independence, free from the oversight of parental authority. Secrets and lies often serve this purpose, creating a private psychological domain accessible only to the adolescent and perhaps a select group of peers. While parents may find the discovery of such secrecy distressing and disappointing, this behavior is an integral part of the individuation process (Blos, 1967). By navigating these private realms, adolescents develop their identities and a greater sense of responsibility.

Notably, the proliferation of virtual spaces in daily life has significantly altered the dynamics of adolescent autonomy. Today, the domains that adolescents inhabit are increasingly shared with adults, limiting their capacity for unsupervised exploration. For instance, skipping school without parental awareness —a meaningful rite of passage in many identity formations— has become almost impossible. Similarly, the management of grades, once an exercise in discretion and responsibility for adolescents, is now often directly accessible to parents via online systems. This immediacy can lead to heightened

parental anxiety, while also absolving young people of the responsibility to decide how and when to communicate about academic struggles.

From a parental perspective, greater control offers a short-lived sense of reassurance but comes with its own costs. In the past, the physical absence of adolescents, as they spent increasing time outside the household, was a source of significant anxiety for parents. Concerns about safety, injuries, conflicts, and the risk of premature sexual activity forced parents to confront their own need to "let go" and begin their own process of separation from their no-longer-children. With the advent of the internet, however, parents' anxieties seem to be more focused on their children's mental distance rather than physical distance. They worry about the amount of time adolescents spend socializing or playing online, fearing that their immersion in screen activities signals isolation or disengagement, even as their physical bodies remain within the household.

Rarely are these two scenarios —past and present— viewed as interconnected, yet the latter is a natural evolution of the former (Giardina, Schimmenti, et al., 2024; Musetti & Corsano, 2018). Adolescents today may be physically present at home, but this does not necessarily place them within their parents' psychological reach. On the contrary, this often pushes young people toward virtual spaces as a means of creating distance. Virtual environments, particularly gaming platforms, offer a unique balance: they are generally tolerated by adults yet remain outside their direct supervision, providing adolescents with a vital sense of autonomy.

The objective of this chapter is to equip adults with the tools to engage responsibly and thoughtfully with the virtual worlds that increasingly shape young people's lives, with a specific focus on their participation in gaming environments. These tools aim to foster greater awareness and understanding of the developmental needs driving adolescents' involvement in such spaces.

2. ONLINE GAMING ENVIRONMENTS

The economist Edward Castronova (2009) suggested that individuals increasingly spend time online, framing this shift as a potential "migration" from physical to virtual environments. McGonigal (2015) expanded on this idea in the context of videogames, by arguing that they are intentionally designed to offer more satisfying and fulfilling experiences than reality. She suggested that it is no surprise individuals gravitate toward gaming when their real-world environments fail to meet their emotional and psychological needs. Therefore, according to McGonigal (2015) videogames have not only reshaped how we perceive reality but also revealed its flaws, offering a blueprint for how it might be improved (Koivisto & Hamari, 2019).

While the realities of the past three decades have changed significantly for reasons extending far beyond technological advancements —factors that themselves drove such progress— it is likely that these scholars overestimated the transformative power of

gaming. Nonetheless, their insights remain valuable, particularly the conceptualization of gaming as a form of "migration." Rather than viewing online games merely as tools or screens to be used for good or ill, it is more apt to consider them as dimensional environments with distinct characteristics and social rules. These environments are places that individuals can enter and leave, much like physical spaces (Giardina, Schimmenti, et al., 2024; Musetti & Corsano, 2018).

Videogames are explicitly designed to captivate, incorporating elements such as timely feedback, calibrated challenges that increase in proportion to the player's skill level, and complex and powerful reward systems. A particularly notable feature of videogames is that they are primarily nonphysical spaces that engage users mentally rather than physically. In this context, Calleja (2010) critiques the implicit assumption that virtuality and reality exist in opposition, arguing that this binary thought creates an artificial and misleading dichotomy. If virtuality is framed as separate from and opposite to reality, playing videogames might be misinterpreted as an act of escapism (Giardina, Schimmenti, et al., 2024). This dichotomy in fact aligns with other polarized views —such as adulthood versus childhood, work versus play, or courage versus fear— that shape cultural perceptions of gaming: for example, it anchors the stereotype that an adult deeply engaged in gaming is regressing to a childish activity, avoiding productivity, or evading the responsibilities of adulthood out of fear (Latinsky & Ueno, 2021). These assumptions perpetuate a reductive narrative about gaming and its role in modern life.

Shifting the perspective from a virtual vs. real dichotomy to a virtual vs. physical framework allows us to reconceptualize gaming as a non-physical domain of reality, rather than something entirely separate from it. This perspective also clarifies a key feature of gaming environments, that is, their capacity to "simulate" emotionally meaningful experiences. In this regard, the experiential potential of videogames is comparable to that of dreams, in that events within the game are often reversible and lack immediate, direct consequences in the physical world. Yet, they can profoundly influence the psychological world of the player (Bown & Gackenbach, 2016; Caro & Popovac, 2021; Domhoff, 2011; Domhoff & Schneider, 2018). In these environments, players can indeed engage in challenges that test their competence and autonomy, and they can also explore diverse social relationships with a reduced fear of being rejected (Fernandez De Henestrosa et al., 2023; Giardina, Schimmenti, et al., 2024; Zsila et al., 2023).

These functions are particularly significant during adolescence and young adulthood, developmental stages marked by the exploration of identity, social roles, and personal abilities. In many instances, young people leverage these experiences, applying the insights and skills they acquire within games to the physical world. Through this process, gaming serves as a dynamic space for learning, personal growth, and the rehearsal of real-world behaviors.

3. THERE AND BACK: TRAVELLING PHYSICAL AND VIRTUAL ENVIRONMENTS

As previously noted, gaming environments are carefully designed to be both challenging and satisfying, with their non-physical and simulative qualities holding significant psychological implications. These environments allow players to explore and fulfill psychological needs that might remain unmet in their offline lives (Schimmenti, 2023). Therefore, it is unsurprising that young people may choose to spend increasing amounts of time gaming online, potentially favoring the virtual over the physical world. But is this truly the case? Are young people spending more time online because they are dissatisfied with the offline world?

The growth of the gaming industry offers some context. By 2018, the Global Games Market reported that the videogame sector —including e-sports— had reached nearly $138 billion in revenue, surpassing the combined global revenues of the music and film industries. The role of online gaming in individuals' lives has also been proposed as a potential indicator of both psychological well-being and psychopathology (Snodgrass et al., 2019).

However, findings from the EU Kids Online survey, whose latest international report was published in 2020, complicate this narrative. While the data confirms an increase in young people's participation in virtual spaces and the associated risks for those aged 9 to 16, only a minority report feeling they can always be themselves online more than in face-to-face interactions (12% on average across countries). Similarly, only 6% say they consistently discuss topics online that they would not broach in physical settings. These findings suggest that, for the majority of young people, the virtual environment functions not as an escape from or compensation for the physical world, but as an extension of it. This clearly challenges the notion that the rise in online engagement is driven primarily by dissatisfaction with offline realities. Instead, it points to the integration of virtual spaces into young people's broader social and psychological landscapes.

Accordingly, Coulson et al. (2020) investigated the attachment to physical and virtual places in a sample of 740 adult players of Massively Multiplayer Online Games (MMOGs). MMOGs are expansive and perpetual virtual worlds, often set in fantasy-inspired landscapes, which players can freely explore. These worlds evolve independently of any single player's actions and offer opportunities for progression through cooperative gameplay to tackle increasingly complex challenges. Players enter these environments with highly customizable avatars whose appearance often reflects their social status and in-game achievements. In this context, MMOG games have long been studied for their potential to foster addictive behaviors (Billieux et al., 2013).

However, recent years have seen growing interest in other genres, such as Multiplayer Online Battle Arenas (MOBAs) like League of Legends, Battle Royales (BRs) like Fortnite, and Real-Time Strategy (RTS) games like StarCraft (for an overview, see Rehbein et al., 2021).

Coulson et al. (2020) found that for MMOG players, physical and virtual environments were comparable in terms of place attachment, though with distinct nuances. Place identity —the degree to which a place becomes part of a person's self-concept— along with social bonding and place uniqueness, were all reported as higher for physical environments. Conversely, place affect —the emotional sense of belonging and meaning— was notably stronger for virtual environments. Also, the study identified contrasting profiles among players. Those with greater attachment to physical places were generally less satisfied with their lives, spent fewer hours per week gaming, and primarily played for achievement-related motivations, such as winning or gaining power. These players were less engaged with their avatars and viewed them less as independent entities, so that Coulson et al. (2020) defined these players as "virtual tourists," individuals who treat the virtual space as a temporary diversion, visiting only for entertainment before returning to physical life. On the other hand, players with greater attachment to virtual places were primarily motivated by social interactions, played for longer durations, and showed higher engagement with their avatars, often perceiving these as independent social beings. These players were termed "dynamic migrants," as they frequently transitioned between physical and virtual environments for emotional or social reasons. Rather than visiting games for fleeting enjoyment, these players might temporarily "drop out" from the virtual world due to the pull of real-life obligations or pleasures, such as family, employment, or other responsibilities. Accordingly, such condition of "dynamic migrants" in videogames embody what can be considered a healthy engagement in gaming. This involvement usually reflects a balanced yet deep passion, with gaming serving as an integral but not exclusive domain of their lives (see next section for further discussion on healthy gaming passion).

Nevertheless, Coulson et al. (2020) also describe forces anchoring individuals within the virtual environment —termed mooring— which can sometimes outweigh the pull factors of the physical world, discouraging re-engagement with physical life. Furthermore, physical-world stressors can act as push factors, driving young people away and increasing their reliance on virtual spaces. Over time, this reliance may lead to significant impairments in daily functioning (Shi et al., 2019).

4. GAMING DISORDER AND PASSION FOR GAMING: USEFUL ELEMENTS OF DISTINCTION

In clinical consultations, parents frequently report their children's academic performance as a key indicator of potential problems related to gaming (Gentile et al., 2011). A decline in grades often triggers concern, prompting parents to investigate possible causes; and if their child is devoting significant time to video games, this is frequently the first explanation they consider. While the co-occurrence of excessive gaming and academic decline does not necessarily imply causation, this parental intuition often takes the form of a suspected diagnosis of Gaming Disorder (GD).

In 2019, the World Health Organization (WHO) officially recognized GD as a clinical condition, characterized by (1) impaired control over gaming, (2) prioritization of gaming to the extent that it displaces other interests and activities, (3) persistence or escalation of gaming despite negative consequences, and (4) functional impairments in multiple areas of daily life. For a diagnosis, these criteria must be met consistently for a minimum of 12 months (WHO, 2024).

The WHO diagnostic framework highlights two critical dimensions: the subjective experience of losing control over gaming and the degree to which gaming interferes with other aspects of life. Specifically, this definition seems to emphasize the importance of evaluating the integration —or lack thereof— between the virtual and physical environments, referred to in clinical terminology as functional impairments. These impairments are assessed across domains such as academic or work responsibilities, family and romantic relationships, and social interactions with peers. Importantly, for a GD diagnosis to be made, multiple areas of life must show impairment. This distinction is crucial, as gaming may sometimes impact specific aspects of functioning without constituting a full-blown disorder. In the context of gambling, Blaszczynski & Nower (2002) differentiated indeed between gambling problems —characterized by discrete issues arising from gambling in specific areas of individuals' functioning— and problem gambling, which involve broader dysfunction and potentially addiction. A similar phenomenon might be observed in gaming, where conflicts within families or couples may arise specifically around time spent gaming or its perceived effects, while other areas of life remain intact.

Therefore, it is inappropriate to diagnose GD because the observed problems are confined to a specific area of life rather than impacting the overall functioning. For example, gaming might serve a distinct function in managing difficulties, such as separating from one's family of origin or addressing couple dynamics (Schimmenti & Caretti, 2010). While these situations may not meet the criteria for GD, they nonetheless warrant the attention of specialists. In fact, such challenges often underlie individuals' initial help-seeking behavior for perceived gaming addiction. These scenarios can lead to crises, emotional distress, and confusion, making them significant enough to require professional intervention.

Another pressing issue for both researchers and parents is how much gaming should be considered too much (Katz et al., 2024). Longitudinal studies provide some insight. Moderate gaming during adolescence (1–13 hours per week) has been linked to positive life outcomes, including a greater likelihood of high school completion. Gender-specific patterns have also been observed: men who played video games in adolescence were more likely to leave their parental home later, while women in this category were more likely to secure full-time employment. However, gaming beyond 14 hours per week during adolescence was associated with a lower probability of obtaining a bachelor's degree later in life (Latinsky & Ueno, 2021).

Therefore, GD is often characterized by significantly higher engagement, with some research identifying between 30 and 40 or more hours per week as a threshold for concern (Katz et al., 2024; Pontes et al., 2022). However, studies suggest that the impact of gaming on well-being also depends on when gaming occurs. Playing extensively during weekday mornings is particularly associated with negative outcomes, as it may interfere with critical daily routines like school or work (Triberti et al., 2018).

Nonetheless, experts widely agree that the number of hours spent gaming alone is not a reliable indicator of GD. Time spent gaming does not effectively differentiate between problematic and non-problematic forms of engagement (Billieux et al., 2019).

To illustrate this point, let us consider two scenarios. The first scenario involves a 25-year-old man who plays about three hours daily, amounting to 20–25 hours per week. His gaming typically occurs during work hours and involves interactions with friends he only meets online. The second scenario features a 17-year-old boy who spends on average 6 to 7 hours daily gaming, reaching approximately 45 hours weekly. He plays primarily in the evenings after completion of school assignments or on the weekend, and mostly with classmates he also interacts with offline.

Despite the apparent disparity in gaming hours, the first case could result in significant functional impairments, such as jeopardizing job performance and financial stability, as gaming intrudes on work responsibilities. In contrast, the second case may reflect a balanced integration of gaming within the individual's routine, with little or no compromission of other areas of life. This highlights the importance of context and timing when evaluating gaming behaviors.

Furthermore, the second scenario exemplifies what researchers describe as high-but-healthy involvement in gaming. This type of engagement reflects an intensive but controlled dedication to gaming that does not disrupt other areas of life. For example, competitive gamers or e-sports participants often invest considerable time in gaming driven by passion rather than addiction (Király et al., 2017; Lehenbauer-Baum & Fohringer, 2015). However, rigid application of diagnostic criteria may misclassify such individuals as gaming-addicted when their behavior aligns more closely with what some researchers define as "gaming problems," which are specific difficulties in certain areas of functioning but not indicative of an addiction (Colder Carras & Kardefelt-Winther, 2018).

Therefore, also the degree and nature of socialization through gaming are critical factors in distinguishing healthy engagement from problematic gaming. Evidence suggests that gamers who actively establish meaningful relationships through gaming report fewer symptoms of problematic gaming (Colder Carras et al., 2017).

In sum, we believe that the relationship between gaming problems and online socialization can be conceptualized as a continuum. At one end of the spectrum are individuals who play online with friends they also meet offline regularly, such as classmates. This group is generally the least likely to experience gaming-related issues. Moving along the continuum, some gamers combine interactions with offline friends and those met exclusively online. Further along are individuals who play excessively and exclusively with

friends encountered online, and at the far end are those who play online in complete isolation without engaging in any form of social interaction. This latter group is the most likely to exhibit problematic gaming behaviors, and more general psychological distress.

We believe that the distinction between these scenarios underscores the complexity of gaming's impact on the lives of young people. The interaction between gaming behavior and social context must be considered to accurately assess the presence of potential problems and to differentiate between passionate engagement and genuine disorder (King et al., 2025).

5. GAMING DISORDER OR SOCIAL WITHDRAWAL?

5.1 Predisposing Factors and Potential Interventions

Videogames have been conceptualized here as environments where individuals can simulate experiences and engage with varying mindsets and needs. In the case of GD, the attachment to these virtual spaces, perceived as sources of comfort, often reflects a need to escape from a physical environment regarded as threatening or discomforting (Giardina, Fournier, et al., 2024; Giardina, Schimmenti, et al., 2024; Schimmenti et al., 2012). This raises important questions about the origins of such perceptions and the appropriate interventions in these cases.

A central factor shaping the nature of gaming engagement is the attitude toward socialization. Accounts from individuals seeking help for gaming-related issues frequently reveal histories marked by struggles to feel integrated within social groups, experiences of exclusion, bullying, or ostracism (Dell'Osso et al., 2023; Kubo et al., 2024; Spiniello et al., 2015). These events often culminate in social anxiety, shame, and feelings of inadequacy in physical settings (Di Blasi et al., 2020; Gioia et al., 2022). This condition, characterized by an expectation of rejection, fears of being perceived as flawed or unworthy of affection, or feelings of imposture, can diminish when social interactions occur within the virtual realm. The mediated nature of virtual communication provides a less intimidating avenue for social interaction, reducing the intensity of such anxieties.

Another recurring theme in the narratives of individuals with problematic gaming behaviors is the perception of competence in gaming juxtaposed with inadequacy in other life domains. Research has highlighted that a significant discrepancy between an individual's ideal self (how they aspire to be) and their actual self (how they perceive themselves) constitutes a risk factor for excessive gaming involvement (Bessière et al., 2007; Lemenager et al., 2020; Li et al., 2021). Videogames, particularly those allowing customizable avatars, often enable players to form emotional attachments to representations of themselves that align more closely with their ideal self. These avatars can embody a more competent, confident, or desirable version of the player, fostering emotional significance and self-expression (Casale et al., 2023; Giardina, Schimmenti, et al., 2024; Szolin et al., 2022).

Closely tied to this perceived inadequacy is the fear of future failure, a concern frequently observed in individuals with problematic gaming habits (Brown et al., 2024; Zsila et al., 2023). Gaming provides a dual function for these individuals: it allows them to avoid confronting their fears while compensating for perceived deficiencies in self-efficacy and competence (Brown et al., 2024; Giardina, Schimmenti, et al., 2024).

When these experiences are considered globally, a clear pattern emerges. Individuals with gaming problems often describe themselves as falling short in life, shaped by adverse interpersonal experiences such as psychological trauma, rejection and exclusion, which is counterbalanced with compensatory fantasies and sometimes unrealistic expectations about their capabilities (Schimmenti & Caretti, 2010). Within gaming, they find opportunities to participate in usually nonjudgmental communities that value their unique and useful abilities, offering them a sense of belonging and recognition.

This dynamic aligns with specific behavioral and personality traits identified in the literature as being associated with problematic gaming. Traits such as perfectionism, social anxiety, and a need for external validation contribute to the vulnerabilities that lead individuals toward gaming as a compensatory and escapist strategy (Di Blasi et al., 2020; Kubo et al., 2024). Such pattern is also driven by internally idealized personal standards, hypersensitivity to rejection and criticism, and a defensive or avoidant approach to interpersonal relationships (Cain et al., 2008; Di Blasi et al., 2020).

Another condition that closely resembles the described features and that is receiving growing attention in western countries is the Hikikomori. The term "Hikikomori" refers to a prolonged withdrawal from societal life, wherein individuals retreat to the confines of their homes, often for months or years. Its onset is typically marked by an initial rejection of external demands such as school or work, often accompanied by psychosomatic complaints and anxiety symptoms. This withdrawal is then exacerbated by a retreat from peer interactions due to a profound sense of inadequacy, fear of rejection, and devaluation of the self. Over time, the home, particularly the individual's personal room, becomes perceived as the sole safe and comfortable space. Efforts by loved ones, such as parents, partners, or friends, to counteract this behavior —often through normative or prescriptive interventions— tend to fail, inadvertently reinforcing the withdrawal. In many cases, online gaming becomes a primary means of maintaining a connection to the outside world, and thus these patterns of social withdrawal are often attributed to internet or gaming addiction (Spiniello et al., 2015; Bonnaire & Roignot, 2022; Dell'Osso et al., 2023; Kubo et al., 2024; Stavropoulos et al., 2019).

For this reason, research has recently started to investigate how GD and Hikikomori intertwine. However, the literature is still stuck in a kind of "chicken and egg" dilemma, in which it is unclear under what circumstances individuals may become addicted to gaming in the effort of surviving their social isolation, or conversely, GD may in the long run disabuse individuals of physical social interactions, thus leading to withdrawal (Kato et al., 2020).

Ongoing research (Giardina, 2025) is currently investigating GD and Hikikomori in a sample of 453 young adults (18-25) gamers, mostly males (78.2%; n=353) selected according to specific criteria, such as hobbies (videogames), gaming hours per week (6+, 9+ and 13+), employment status (unemployed; not in paid work; other, e.g. student); weekly device usage (everyday; multiple times a day). Preliminary results have shown that 52% (n=239) screened positively for the Hikikomori, and 4.9% (n=22) screened positively for GD according to the fulfillment of the four ICD-11 criteria. Among individuals screening positively for GD, 81.82% (n=18) also showed Hikikomori, thus presenting both conditions. Only 4 subjects showed GD alone, while the percentage of individuals showing Hikikomori without GD was 48.9% (n=221).

Overall, this picture might suggest that the Hikikomori is a more widespread condition than GD, giving credit to the idea that most individuals with GD may in fact be socially withdrawn who use gaming to socialize and gain recognition and social role, with important repercussions on the intervention. Nevertheless, research on the subject is still at the early stages and more studies are needed to understand the trajectories of intersection of these problems.

5.2 Common reactions and potential alternatives

From a clinical perspective, providing guidance on how to respond when gaming becomes deeply dissociated from the physical environment and serves as the primary mechanism for coping with internal and psychosocial difficulties —essentially resembling an addictive phenomenon— is a nuanced and delicate task. Each case presents unique circumstances, and there is no universal solution. Ideally, the therapeutic process would involve dedicating time to thoroughly explore the specifics of each situation and collaboratively develop tailored strategies that resonate with the individual and their context.

Premature or overly prescriptive advice risks pushing caregivers to act outside their capabilities or natural inclinations, which may ultimately lead to frustration and a diminished sense of confidence in themselves and the therapeutic process. At the same time, parents often arrive at consultations having exhausted their perceived options, presenting the therapist with a palpable sense of helplessness.

This sense of powerlessness warrants careful acknowledgment, as does the accompanying fear for their child's future and a profound sense of disappointment. Parents are often burdened with pressing questions such as, *"What did I do wrong to cause my child to struggle in this way?"*. These thoughts reflect a binary perception —either something is fundamentally wrong with their child, or the fault lies within them. Recognizing and addressing these complex emotions is an essential aspect of the therapeutic journey, requiring sensitivity, empathy, and a focus on fostering a collaborative and supportive environment.

The fear of being perceived as disappointing parents must be explicitly acknowledged and accepted as an essential first step. This process is critical to preventing the externalization of such fears through inappropriate and ineffective reactions, such as damaging gaming devices or imposing overly controlling measures on time spent playing. While

these interventions may momentarily alleviate parental distress and disappointment, they tend to yield more harm than benefit, often exacerbating the issue (Lancini, 2015), because they are felt by young people as an exercise of parental power devoid of any real understanding toward their feelings.

It may also be helpful for parents to reflect on the reality that no one is inherently equipped with the skills to be a "perfect" parent. Each stage of a child's development presents unique challenges, often requiring adaptations for which parents may feel unprepared. Furthermore, how parents behave during a specific phase of a child's life is significantly —but not always consciously— shaped by how they experienced that same phase as children and how their own parents behaved (Schafer, 1968). This cyclical dynamic inevitably leaves room for errors of various kinds. However, acknowledging and understanding these mistakes is crucial for self-awareness and the ability to identify the most effective strategies for each unique moment in the child's development.

A recurring concern among parents is the unsettling image of their child engrossed in video games —detached, absent, and seemingly disengaged. This perception is often interpreted as a form of rejection, especially when it occurs within the shared space of a home. Parents may feel that, while their child continues to benefit from the comforts and resources of living under the same roof, the relational aspect of their coexistence has been diminished or entirely absent. This dynamic is often interpreted by parents as a rejection of themselves, particularly since it occurs within the context of sharing a household, where the child benefits from living under their roof while seemingly withholding the relational connection.

However, what might appear as rejection, emotional detachment, or even overt hostility often conceals a deeper emotional landscape characterized by disorientation, fear, and profound inadequacy —emotions that can culminate in depressive states, particularly in severe cases.

Based on the insights discussed so far, it can be helpful for parents to consider that when their child is overinvolved with videogames, he or she finds something vital within the gaming environment that is unable to access elsewhere. In essence, the young person may desire a fulfilling life outside of gaming but feels constrained by specific internal or external barriers (Giardina, Schimmenti, et al., 2024). Recognizing this, it becomes essential to adopt a stance of patient observation, aiming to discern the developmental trajectory that has led to this reliance on gaming and to identify the obstacles preventing meaningful engagement in activities beyond the virtual realm. Frequently, this involves addressing psychological distress linked to profound feelings of inadequacy and shame, and the sense of hopelessness about the possibility of real change in coping with them.

While the stance of observation may be misconstrued by parents as "doing nothing," it serves a crucial purpose. By alleviating the pressures felt by the young person —pressures that may not be immediately apparent— it creates a space for potential change.

Moreover, it allows parents to gather valuable insights about their child's behavior and emotional state, insights that can prove indispensable when shared with a professional.

In effective therapeutic contexts, clinicians may "use" parents as co-therapists, recognizing them as sometimes the only viable bridge to support a child who has withdrawn into the virtual world. A significant part of the therapeutic process with parents involves encouraging them to develop a representation of their child that is less clouded by their own feelings of guilt or disappointment and more attuned to the child's subjective reality. This requires parents to acknowledge and work through the emotions that clutter their mental space —emotions that can obscure their perception of their child— and to channel that space toward understanding and addressing the young person's distress.

Ultimately, the process involves shifting the parental focus from impulsive, infantilizing, or even reactionary interventions to a compassionate, reflective approach, thereby fostering an environment conducive to their child's healing and growth.

6. CONCLUSIONS

In this chapter, we provided elements to recognize and understand problematic gaming with its different functions and distinguish this from a healthy yet intense passion for gaming. Passion, even when intense, is typically balanced with daily life, does not impair relationships, school performance, or overall well-being, and often offers opportunities for motivation, learning, and connection. GD, by contrast, involves a rigid and compulsive use of video games that significantly interferes with various life domains and functions as a dominant coping mechanism to avoid emotional pain, unresolved conflicts, or feelings of inadequacy. Understanding this difference helps prevent overreactions and stigma, allowing for more accurate support and constructive family dialogue.

Furthermore, we have underlined how grasping the nature of gaming involvement —especially during adolescence— requires looking beyond surface behaviors to recognize the underlying emotional, relational, and identity-related needs often expressed through virtual play. Videogames are not merely a pastime; they are environments where young people seek autonomy, recognition, and sometimes refuge. When gaming becomes excessive or a source of conflict, it is natural for parents to feel frightened, helpless, or unsure. Yet impulsive or control-based reactions may inadvertently deepen the very distance they hope to bridge, above all according to more recent research connecting GD to social withdrawal (e.g., Hikikomori) conditions. Instead, adopting a stance of empathetic, non-judgmental observation —and striving to understand what gaming means to their child— can create new space for connection and dialogue. In this space, not only distress but also the desire for change can emerge. It is important to remember that seeking professional help is not an admission of failure, but an act of care. And often, the key to change is not fighting the game, but understanding the person who turns to it.

REFERENCES

Baricco, A. (2018). *The Game*. Torino, Italia: Einaudi.

Bessière, K., Seay, A. F., & Kiesler, S. (2007). The Ideal Elf: Identity Exploration in World of Warcraft. *CyberPsychology & Behavior*, *10*(4), 530–535. https://doi.org/10.1089/cpb.2007.9994

Billieux, J., Flayelle, M., Rumpf, H.-J., & Stein, D. J. (2019). High Involvement Versus Pathological Involvement in Video Games: A Crucial Distinction for Ensuring the Validity and Utility of Gaming Disorder. *Current Addiction Reports*, *6*(3), 323–330. https://doi.org/10.1007/s40429-019-00259-x

Billieux, J., Van Der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviours in the virtual world of Azeroth. *Computers in Human Behavior*, *29*(1), 103–109. https://doi.org/10.1016/j.chb.2012.07.021

Blaszczynski, A., & Nower, L. (2002). *A pathways model of problem and pathological gambling*.

Blos, P. (1967). The Second Individuation Process of Adolescence. *The Psychoanalytic Study of the Child*, *22*(1), 162–186. https://doi.org/10.1080/00797308.1967.11822595

Bonnaire, C., & Roignot, Z. (2022). *Relationship Between Social Withdrawal (Hikikomori), Personality, and Coping in an Adult Population* [Preprint]. In Review. https://doi.org/10.21203/rs.3.rs-2095361/v1

Bown, J., & Gackenbach, J. (2016). Video Games, Nightmares, and Emotional Processing. In *Emotions, Technology, and Digital Games* (pp. 3–14). Elsevier. https://doi.org/10.1016/B978-0-12-801738-8.00001-4

Bretherton, I. (2013). The origins of attachment theory: John Bowlby and Mary Ainsworth. In *Attachment theory* (pp. 45-84). Routledge.

Brown, T., Blinka, L., Dadswell, K., Kowert, R., Zarate, D., & Stavropoulos, V. (2024). User-Avatar discrepancy scale: A comparative measurement of self and avatar views. *Behaviour & Information Technology*, 1–18. https://doi.org/10.1080/0144929X.2024.2381603

Cain, N. M., Pincus, A. L., & Ansell, E. B. (2008). Narcissism at the crossroads: Phenotypic description of pathological narcissism across clinical theory, social/personality psychology, and psychiatric diagnosis. *Clinical Psychology Review*, *28*(4), 638–656. https://doi.org/10.1016/j.cpr.2007.09.006

Calleja, G. (2010). Digital Games and Escapism. *Games and Culture*, *5*(4), 335–353. https://doi.org/10.1177/1555412009360412

Campbell, W. K., & Campbell, S. M. (2009). On the Self-regulatory Dynamics Created by the Peculiar Benefits and Costs of Narcissism: A Contextual Reinforcement Model and Examination of Leadership. *Self and Identity*, *8*(2–3), 214–232. https://doi.org/10.1080/15298860802505129

Caro, C., & Popovac, M. (2021). Gaming When Things Get Tough? Examining How Emotion Regulation and Coping Self-Efficacy Influence Gaming During Difficult Life Situations. *Games and Culture*, *16*(5), 611–631. https://doi.org/10.1177/1555412020944622

Casale, S., Musicò, A., Gualtieri, N., & Fioravanti, G. (2023). Developing an intense player-avatar relationship and feeling disconnected by the physical body: A pathway towards internet gaming disorder for people reporting empty feelings? *Current Psychology*, *42*(24), 20748–20756. https://doi.org/10.1007/s12144-022-03186-9

Castronova, E. (2007). *Exodus to the Virtual World: How online fun is changing reality*. Basingstoke, United Kingdom: Palgrave Macmillan.

Colder Carras, M., & Kardefelt-Winther, D. (2018). When addiction symptoms and life problems diverge: A latent class analysis of problematic gaming in a representative multinational sample of European adolescents. *European Child & Adolescent Psychiatry*, *27*(4), 513–525. https://doi.org/10.1007/s00787-018-1108-1

Colder Carras, M., Van Rooij, A. J., Van De Mheen, D., Musci, R., Xue, Q.-L., & Mendelson, T.

(2017). Video gaming in a hyperconnected world: A cross-sectional study of heavy gaming, problematic gaming symptoms, and online socializing in adolescents. *Computers in Human Behavior*, *68*, 472–479. https://doi.org/10.1016/j.chb.2016.11.060

Coulson, M., Oskis, A., Spencer, R., & Gould, R. L. (2020). Tourism, migration, and the exodus to virtual worlds: Place attachment in massively multiplayer online gamers. *Psychology of Popular Media*, *9*(4), 525–532. https://doi.org/10.1037/ppm0000244

Dell'Osso, L., Amatori, G., Muti, D., Giovannoni, F., Parri, F., Violi, M., Cremone, I. M., & Carpita, B. (2023). Autism Spectrum, Hikikomori Syndrome and Internet Gaming Disorder: Is There a Link? *Brain Sciences*, *13*(7), 1116. https://doi.org/10.3390/brainsci13071116

Di Blasi, M., Giardina, A., Lo Coco, G., Giordano, C., Billieux, J., & Schimmenti, A. (2020). A compensatory model to understand dysfunctional personality traits in problematic gaming: The role of vulnerable narcissism. *Personality and Individual Differences*, *160*, 109921. https://doi.org/10.1016/j.paid.2020.109921

Domhoff, G. W. (2011). *Dreams Are Embodied Simulations That Dramatize Conception and Concerns: The Continuity Hypothesis in Empirical, Theoretical, and Historical Context*. https://doi.org/10.11588/IJODR.2011.2.9137

Domhoff, G. W., & Schneider, A. (2018). Are dreams social simulations? Or are they enactments of conceptions and personal concerns? An empirical and theoretical comparison of two dream theories. *Dreaming*, *28*(1), 1–23. https://doi.org/10.1037/drm0000080

Fernandez De Henestrosa, M., Billieux, J., & Melzer, A. (2023). Last Man Standing: Battle Royale Games Through the Lens of Self-Determination Theory. *Games and Culture*, *18*(4), 427–448. https://doi.org/10.1177/15554120221101312

Gentile, D. A., Choo, H., Liau, A., Sim, T., Li, D., Fung, D., & Khoo, A. (2011). Pathological Video Game Use Among Youths: A Two-Year Longitudinal Study. *Pediatrics*, *127*(2), e319–e329. https://doi.org/10.1542/peds.2010-1353

Giardina, A. (2025). *Am I addicted or am I alone? The social withdrawal and gaming disorder interplay in the light of the Compensatory-Dissociative Online Gaming model* [Doctoral dissertation, University of Lausanne].

Giardina, A., Fournier, L., Starcevic, V., King, D. L., Di Blasi, M., Schimmenti, A., & Billieux, J. (2024). From active escapism to virtual withdrawal: Validation of the Compensatory-Dissociative Online Gaming scales (C-DOGs). *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2024.00059

Giardina, A., Schimmenti, A., Starcevic, V., King, D. L., Di Blasi, M., & Billieux, J. (2024). Problematic gaming, social withdrawal, and Escapism:The compensatory-dissociative online gaming (C-DOG) model. *Computers in Human Behavior*, 108187. https://doi.org/10.1016/j.chb.2024.108187

Gioia, F., Colella, G. M., & Boursier, V. (2022). Evidence on Problematic Online Gaming and Social Anxiety over the Past Ten Years: A Systematic Literature Review. *Current Addiction Reports*, *9*(1), 32–47. https://doi.org/10.1007/s40429-021-00406-3

Katz, D., Horváth, Z., Pontes, H. M., Koncz, P., Demetrovics, Z., & Király, O. (2024). How much gaming is too much? An analysis based on psychological distress. *Journal of Behavioral Addictions*, *13*(3), 716–728. https://doi.org/10.1556/2006.2024.00036

Király, O., Tóth, D., Urbán, R., Demetrovics, Z., & Maraz, A. (2017). Intense video gaming is not essentially problematic. *Psychology of Addictive Behaviors*, *31*(7), 807–817. https://doi.org/10.1037/adb0000316

Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, *45*, 191–210. https://doi.org/10.1016/j.ijinfomgt.2018.10.013

Kubo, T., Horie, K., Matsushima, T., Tateno, M., Kuroki, T., Nakao, T., & Kato, T. A. (2024). Hikikomori and gaming disorder tendency: A case-control online survey for nonworking adults. *Psychiatry and Clinical Neurosciences*, *78*(1), 77–78. https://doi.org/10.1111/pcn.13614

Lancini, M. (2015). *Adolescenti navigati*. Edizioni Centro Studi Erickson.

Latinsky, A., & Ueno, K. (2021). Leveling Up? Video Game Play in Adolescence and the Transition into Adulthood. *The Sociological Quarterly*, *62*(1), 36–59. https://doi.org/10.1080/00380253.2019.1711265

Lehenbauer-Baum, M., & Fohringer, M. (2015). Towards classification criteria for internet gaming disorder: Debunking differences between addiction and high engagement in a German sample of World of Warcraft players. *Computers in Human Behavior*, *45*, 345–351. https://doi.org/10.1016/j.chb.2014.11.098

Lemenager, T., Neissner, M., Sabo, T., Mann, K., & Kiefer, F. (2020). "Who Am I" and "How Should I Be": A Systematic Review on Self-Concept and Avatar Identification in Gaming Disorder. *Current Addiction Reports*, *7*(2), 166–193. https://doi.org/10.1007/s40429-020-00307-x

Li, Y., Li, Y., & Castaño, G. (2021). The Mechanism Underlying the Effect of Actual-Ideal Self-Discrepancy on Internet Gaming Addiction: A Moderated Mediation Model. *International Journal of Mental Health and Addiction*, *19*(1), 283–301. https://doi.org/10.1007/s11469-020-00273-5

McGonigal, J. (2011). *Reality is broken: Why games make us better and how they can change the world*. Penguin.

McWilliams, N. (2011). *Psychoanalytic diagnosis: Understanding personality structure in the clinical process*. Guilford Press.

Musetti, A., & Corsano, P. (2018). The Internet Is Not a Tool: Reappraising the Model for Internet-Addiction Disorder Based on the Constraints and Opportunities of the Digital Environment. *Frontiers in Psychology*, *9*, 558. https://doi.org/10.3389/fpsyg.2018.00558

Pontes, H. M., Schivinski, B., Kannen, C., & Montag, C. (2022). The interplay between time spent gaming and disordered gaming: A large-scale world-wide study. *Social Science & Medicine*, *296*, 114721. https://doi.org/10.1016/j.socscimed.2022.114721

Rehbein, F., King, D. L., Staudt, A., Hayer, T., & Rumpf, H.-J. (2021). Contribution of Game Genre and Structural Game Characteristics to the Risk of Problem Gaming and Gaming Disorder: A Systematic Review. *Current Addiction Reports*, *8*(2), 263–281. https://doi.org/10.1007/s40429-021-00367-7

Schimmenti, A. (2023). Beyond addiction: Rethinking problematic Internet use from a motivational framework. *Clinical Neuropsychiatry*, *20*(6), 471–478. https://doi.org/10.36131/cnfioritieditore20230601

Schimmenti, A., & Caretti, V. (2010). Psychic retreats or psychic pits?: Unbearable states of mind and technological addiction. *Psychoanalytic Psychology*, *27*(2), 115.

Schimmenti, A., Guglielmucci, F., Barbasio, C., & Granieri, A. (2012). Attachment disorganization and dissociation in virtual worlds: A study on problematic Internet use among players of online role playing games. *Clinical Neuropsychiatry: Journal of Treatment Evaluation, 9*(5), 195–202.

Schimmenti, A. (2022). The aggressor within: Attachment trauma, segregated systems, and the double face of shame. In O.B. Epstein (Ed). *Shame matters: Attachment and relational perspectives for psychotherapists* (pp. 114-132). Routledge/Taylor & Francis Group

Shi, J., Renwick, R., Turner, N. E., & Kirsh, B. (2019). Understanding the lives of problem gamers: The meaning, purpose, and influences of video gaming. *Computers in Human Behavior*, *97*, 291–303. https://doi.org/10.1016/j.chb.2019.03.023

Schafer, R. (1968). *Aspects of internalization*. International Universities Press, Inc.

Snodgrass, J. G., Dengah, H. J. F., Polzer, E., & Else, R. (2019). Intensive online videogame involvement: A new global idiom of wellness and distress. *Transcultural Psychiatry*, *56*(4), 748–774. https://doi.org/10.1177/1363461519844356

Spiniello, R., Piotti, A., & Comazzi, D. (2015). *Il corpo in una stanza. Adolescenti ritirati che vivono di computer: Adolescenti ritirati che vivono di computer*. FrancoAngeli.

Stavropoulos, V., Anderson, E. E., Beard, C., Latifi, M. Q., Kuss, D., & Griffiths, M. (2019). A preliminary cross-cultural study of Hikikomori and Internet Gaming Disorder: The

moderating effects of game-playing time and living with parents. *Addictive Behaviors Reports*, *9*, 100137. https://doi.org/10.1016/j.abrep.2018.10.001

Szolin, K., Kuss, D., Nuyens, F., & Griffiths, M. (2022). Gaming Disorder: A systematic review exploring the user-avatar relationship in videogames. *Computers in Human Behavior*, *128*, 107124. https://doi.org/10.1016/j.chb.2021.107124

Triberti, S., Milani, L., Villani, D., Grumi, S., Peracchia, S., Curcio, G., & Riva, G. (2018). What matters is when you play: Investigating the relationship between online video games addiction and time spent playing over specific day phases. *Addictive Behaviors Reports*, *8*, 185–188. https://doi.org/10.1016/j.abrep.2018.06.003

Veen, W., & Vrakking, B. (2006). *Homo Zappiens: Growing up in a digital age*. A&C Black.

WHO (2024). Clinical descriptions and diagnostic requirements for ICD-11 mental, behavioural and neurodevelopmental disorders (CDDR). Retrieved online from https://www.who.int/publications/i/item/9789240077263

Zsila, Á., Shabahang, R., Aruguete, M. S., Bőthe, B., Demetrovics, Z., & Orosz, G. (2023). Pursuing virtual perfection: Preoccupation with failure mediates the association between internalized parental criticism and gaming disorder. *Computers in Human Behavior*, *145*, 107775. https://doi.org/10.1016/j.chb.2023.107775

9

NON-SUBSTANCE ADDICTIONS AND THEIR COMORBIDITIES

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ABSTRACT:

Non-substance addictions, also known as behavioral addictions, involve addictive behaviors (i.e., gaming and gambling) rather than the use of substances. These addictions involve harmful and persistent engagement in various behaviors, including gambling, gaming, sexual activity, shopping, eating, social media use, and other internet-based activities. This chapter provides an updated overview of the etiology of non-substance addictions, as well as recent findings on comorbidity and dual pathology. The underlying pathology of non-substance addictions remains partially understood and may differ across addiction types, requiring a multidimensional approach that integrates biological, psychological, and social perspectives. Research suggests that individuals with non-substance addictions may exhibit reward circuit dysfunctions similar to those observed in substance addictions. Key pathological factors include genetic predisposition, neurobiological changes, psychological influences, social determinants, and technological advancements.

Non-substance addictions often co-occur with various medical issues, including both physical and mental health conditions. However, research on these comorbidities, including empirical data, remains limited. Recent studies have enhanced our understanding of the interplay between non-substance addictions and physical health conditions. Commonly associated physical conditions include cardiovascular, metabolic, musculoskeletal, and vision problems. Non-substance addictions are also frequently co-morbid with mental disorders such as depressive disorders, anxiety disorders, obsessive-compulsive disorder, post-traumatic stress disorder, eating disorders, and attention deficit hyperactivity disorder. These comorbidities fall under dual diagnosis, a concept that refers to the simultaneous presence of a mental disorder and an addiction in the same individual.

Effective management of non-substance addictions requires a holistic approach that addresses both the addictions and their co-occurring conditions. However, evidence on comorbidities and dual pathology involving these addictions remains limited. Advancing knowledge in this area demands interdisciplinary research and innovative thinking, both essential for developing evidence-based interventions targeting these addictions and comorbid health issues.

KEYWORDS:

addiction, mental disorders, addictive behavior, etiology, pathology

1. A ETIOLOGY OF NON-SUBSTANCE ADDICTIONS

1.1 Overview: A etiology

Increasingly, non-substance addictions (aka., behavioral addictions) are becoming a subject of concern in the field of public health and addiction research (Brand, 2025). These conditions are characterized by compulsive engagement in rewarding behaviors that do not involve any use of substances (Grant, 2015; Potenza, 2013). Although there are no physiological alterations caused by neural-chemical coupling, non-substance addictions exhibit notable resemblances to substance use disorders in terms of their presentation, neurological foundations, and effects on persons' lives (Ziauddeen & Fletcher, 2012).

The understanding of non-substance addictions has seen substantial development in recent decades (Almourad et al., 2020). A significant milestone was reached in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) when "Gambling Disorder" was added to the category of "Substance-Related and Addictive Disorders" (American Psychiatric Association, 2013). This inclusion signifies the initial formal acknowledgment of non-substance addiction as a diagnosable condition, on equal footing with substance addictions. Given the extensive research on the adverse effects of excessive internet gaming, the DSM-5 includes Internet Gaming Disorder (IGD) as a potential non-substance addiction under the category of "Conditions for Further Study." This indicates the necessity for further investigation before establishing a formal classification (American Psychiatric Association, 2013). The 11th edition of the International Classification of Diseases (ICD-11) formally included Gambling Disorder and Gaming Disorder as mental health conditions under "Disorders due to addictive behaviours" (World Health Organization, 2025). Furthermore, the ICD-11 recognizes a condition related to sexual behavior, another potential addictive behavior, by classifying 'compulsive sexual behavior disorder' under 'Impulse Control Disorders.' Although compulsive sexual behavior disorder is not classified under "disorders due to addictive

behaviours" in ICD-11, it is frequently discussed in the behavioural addiction literature due to shared phenomenological and neurobiological features.

Aside from those three disorders, previous research has explored other potential non-substance addictions, including compulsive behavioral patterns related to internet use, mobile phone use, social media use, shopping, eating, and sexual behavior (Potenza, 2013). All of these may be diagnosed under the ICD-11 category "Other specified disorders due to addictive behaviors." However, etiological evidence, particularly biological evidence, remains largely centered on Gambling Disorder and Gaming Disorder, with limited research across other non-substance addictions. It is also worth noting that several 'addictive behaviors', such as excessive use of the internet and smartphones, which have been extensively studied, may be heterogeneous in nature (James et al., 2023). These behaviors often encompass activities like gaming, gambling, online shopping, and social media use, and therefore may not represent a single, distinct non-substance-related addiction, but rather a cluster of related addictive behaviors (Rozgonjuk et al., 2021). For clarity, this chapter uses the term "non-substance addictions" descriptively to refer to addictive behavioural patterns not involving psychoactive substances, while "disorders due to addictive behaviours" is used when referring to the ICD-11 diagnostic classification.

1.2 Characteristics of non-substance addictions

Researchers, academic societies, and international organizations have reached a consensus on the standard features of non-substance addictions (Grant & Chamberlain, 2015). Drawing on existing evidence and international expert consensus, World Health Organization (WHO, 2024) has established clinical descriptions and diagnostic criteria for non-substance addictions ("disorders due to addictive behaviours"). The essential features of non-substance addictions include impaired control over the behavior (individuals find it challenging to limit the behavior in terms of its onset, frequency, intensity, duration, termination, context, etc.); increasing priority given to the behavior over other activities (The addictive behavior becomes more critical compared to other daily activities and responsibilities); continuation or escalation of the behavior despite negative consequences (Individuals persist in the behavior despite adverse effects on their health, finances, and relationships); significant impairment or distress in various life domains (the addiction causes substantial problems in personal, social, occupational, or educational areas of life). Despite the shared characteristics of substance addiction, such as impaired control, relapse, and cue reactivity (environmental cues linked to the addictive behavior can elicit strong urges or cravings), non-substance addictions differ significantly in terms of their exogenous effects on the brain, physical health consequences, and social acceptance.

Firstly, non-substance addictions do not entail the ingestion of exogenous chemicals into the biochemical system. Nevertheless, they continue to stimulate neuroplastic alterations gradually, impacting brain circuits implicated in reward, motivation, and decision-making (Blanco et al., 2002; Grant et al., 2006; Goldstein & Volkow, 2011). Secondly, unlike substance use, which can result in overdose and acute physical health problems, non-substance

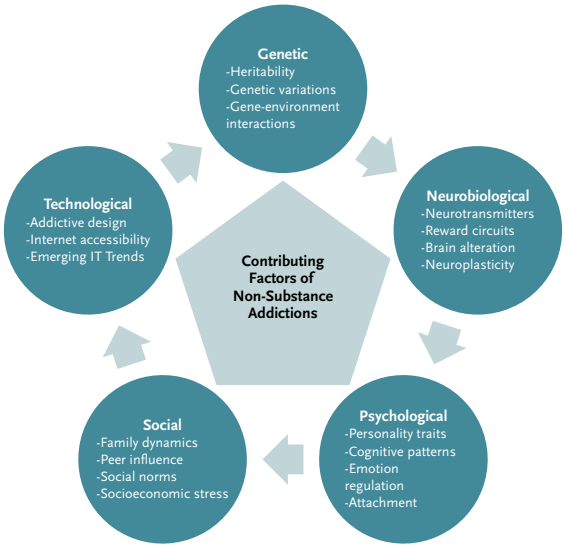
addictions typically present less immediate physical risk. Nevertheless, these activities can contribute to significant long-term health consequences, such as obesity resulting from food addiction or repetitive strain injuries caused by excessive gaming (Blanco et al., 2002; Goldstein & Volkow, 2011; Tholl et al., 2022). Third, addictive behaviour like gaming and internet overuse is frequently more socially acceptable or even promoted (e.g., e-sports, game products advertising), which adds complexity to the identification and management of these behaviors (Ayala-Rojas et al., 2024; Sağlam & Karanfiloğlu, 2022).

Having a comprehensive understanding of these parallels and distinctions is of utmost importance for conducting etiological research on non-substance addictions and formulating suitable diagnostic criteria, treatment methods, and prevention initiatives for such addictions (Long, Qi, & Carragher, 2023). It is becoming more and more evident as this field of study develops that non-substance addictions pose a serious threat to both public and individual health. Thorough investigations and comparative interpretations are crucial to clarify the neurobiological and psychological foundations of these disorders (Blanco et al., 2002; Gola & Potenza, 2016).

1.3 Contributing factors to non-substance addictions

Non-substance addictions have an uncertain etiology. It is well recognized as being multidimensional, encompassing an intricate interaction of genetic, neurobiological, psychological, environmental, behavioral, cognitive, and social elements (Figure 1). Non-substance addictions are influenced by both biological and environmental factors. Genetic predisposition, as a fundamental biological factor, underlies various physiological and psychological vulnerabilities (Blum et al., 2015, Shen et al., 2017).

Figure 1. *Illustration of contributing factors to addictions*



1.3.1 *Genetic factors*

Genetic variables play an important role in the development of non-substance addictions by affecting vulnerability through hereditary characteristics, neurological mechanisms, and interactions with the physical surroundings (Gyollai et al., 2014; Lobo & Kennedy, 2006; Li et al., 2021; Werling & Grünblatt, 2022). Although genetic predispositions do not ensure the occurrence of addiction, they establish a basis on which other elements, like the environment and personal experiences, exert influence. Analysis of the genetic foundations of non-substance addictions can facilitate the identification of individuals who are at risk and the development of tailored prevention and treatment approaches.

Investigations, including twin and family studies, have demonstrated that non-substance addictions exhibit a genetic element. Specifically, the estimated heritability of gambling addiction ranges from 50% to 60%, indicating that genetics plays a substantial role in the risk (Lobo & Kennedy, 2009). This observation suggests that persons who have a familial background of addictions unrelated to substances may inherit genetic tendencies that enhance their probability of acquiring comparable behaviors. Non-substance addictions are characterized by polygenicity, whereby the risk is influenced by numerous related genes. These genetic factors frequently impact characteristics such as impulsivity, sensitivity to rewards, and reactivity to stress, which play a crucial role in the development, maintenance, and relapse of addictive behaviors. Genetic variations in neurotransmitter systems, including dopamine, serotonin, and glutamate, might influence the interpretation of rewards and pleasures in individuals, therefore increasing their susceptibility to addictive behaviors.

The interplay between genes and the environment is crucial in non-substance addictions as well. The manifestation of genetic predispositions is frequently influenced by environmental variables. For example, an individual with a hereditary inclination towards impulsivity may only acquire an addiction when they are exposed to particular environmental stimuli, such as convenient availability of gambling or stressful living circumstances (Xuan et al., 2017). Conversely, a nurturing environment may alleviate the hereditary susceptibility, therefore decreasing the probability of developing a non-substance addiction. Furthermore, gene expression can be influenced by environmental influences via epigenetic alterations, including DNA methylation or histone modification (Li et al., 2021). These modifications have the potential to modify the activity of genes implicated in neurotransmitter systems, stress responses, and other pathways associated with addiction. Indeed, persistent stress can result in epigenetic alterations that heighten the susceptibility of persons with a genetic predisposition to addiction.

1.3.2 *Neurobiological factors*

In spite of the lack of external chemical agents, the neurobiology of non-substance addictions exhibits several parallels with substance addictions. A comprehensive grasp of these neurological processes is essential for the development of efficacious interventions and therapies. This section delves into the essential neurobiological elements

implicated in non-substance addictions, with a specific emphasis on abnormalities in reward circuits, imbalances in neurotransmitters, changes in brain structure and function, and neuroplastic phenomena.

Disruptions in Neurotransmitter Balance. Distinct neurotransmitter systems, such as dopamine, serotonin, norepinephrine, glutamate, and gamma-aminobutyric acid (GABA), are involved in the neurobiology of non-substance addictions. Dopamine is essential in the processes of reinforcement learning and motivation. Investigations have demonstrated changes in dopamine signaling in persons with non-substance addictions, which are comparable to those observed in substance addictions. Decreased availability of dopamine D2 receptors has been detected in the striatum of those diagnosed with gambling disorder (Boileau et al., 2013). Serotonin plays a role in regulating mood, controlling impulses, and inhibiting compulsive behaviors. Aberrations in serotonin function are linked to heightened impulsivity and risk-taking behaviors in individuals with non-substance addictions (Blanco et al., 2002). Norepinephrine plays a role in both arousal and cognitive focus. Heightened noradrenergic activity has been observed in individuals with gambling disorder (Brevers et al., 2016; Clark et al., 2012) , particularly during near-miss experiences (i.e., experiences of facing non-win outcomes that are, in some sense, close to a significant payout). Furthermore, glutamate and GABA play vital roles in controlling brain excitability and have been linked to the shift from regulated to compulsive behavior in addiction (Chen et al., 2015). Furthermore, the hypothalamic-pituitary-adrenal (HPA) axis, responsible for controlling the stress response, is associated with non-substance addictions. Impairment of this system can result in modified cortisol levels and heightened susceptibility to stress, therefore facilitating the perpetuation of addictive behaviors (Wang, Simkute, & Griskova-Bulanova, 2023).

Reward Circuit Deficiencies. The brain's reward system, particularly the mesolimbic dopamine pathway, plays a central role in the development and maintenance of non-substance addictions. This pathway includes the ventral tegmental area (VTA) and the nucleus accumbens (NAc). Neuroimaging studies have shown alterations in the functioning of this reward circuit in individuals with behavioral addictions. For instance, research on gambling disorder has demonstrated reduced activation in the ventral striatum and prefrontal cortex during reward anticipation and processing (García-Castro, Cancela, & Cárdaba, 2022). Similar findings have been observed in individuals with other behavioral addictions (Brand et al., 2016; Schettler, Thomasius, & Paschke, 2022). These reward circuit deficiencies contribute to reduced sensitivity to natural rewards but increased sensitivity to addiction-related cues. It can also lead to impaired ability to experience pleasure from non-addictive activities (anhedonia), which means that patients of addiction have a diminished ability to enjoy non-addictive behaviors. The reward deficiency syndrome hypothesis suggests that individuals with these neurobiological alterations may be more prone to seeking out intense stimuli (like gambling or excessive gaming) to compensate for their underactive reward systems (Blum et al., 2015).

Alterations in Brain Structure and Function. The brains of those with non-substance addictions have been shown to exhibit both structural and functional alterations through neuroimaging investigations. The aforementioned regions encompass the prefrontal cortex, striatum, amygdala, insular regions, and others. The prefrontal cortex (PFC) is deeply implicated in the development of non-substance addictions because of its participation in executive functioning, decision-making, impulse control, and emotion regulation (Chen et al., 2015). The presence of decreased gray matter volume and modified activation patterns in PFC is linked to compromised executive functions, such as decision-making and impulse control. The striatum, an essential component of the reward system, is routinely documented to exhibit both structural and functional changes. There is evidence of decreased striatal volume in persons diagnosed with gaming disorder (Zhou et al., 2020). Alterations in the structure and function of the amygdala are associated with modified emotional processing and heightened responsiveness to cues in non-substance addictions (Brand et al., 2016). Correlations between modified insular activation and desire and interoceptive awareness have been observed in both substance and non-substance addictions (Brevers et al., 2016).

Abnormity in neuroplasticity. Neuroplasticity is the capacity of the brain to generate new neural connections and alter existing ones in reaction to certain experiences. Within the realm of addiction, neuroplasticity assumes a pivotal function in the progression from voluntary conduct to addictive patterns. Essential neuroplastic changes seen in non-substance addictions encompass synapse plasticity, structural plasticity, and network-level plasticity. Alterations in the structural integrity of synaptic connections, namely in the reward circuit, play a role in the development of memories and behaviors associated with addiction. Neuronal structural plasticity refers to the reported changes in the physical structure of neurons, including changes in dendritic spine density, in both drug and non-substance addictions (Olsen, 2011). Network-level plasticity refers to the observed large-scale alterations in brain network connections among persons who have non-substance addictions. One example is the observation of modified functional connectivity between the prefrontal cortex and striatum in individuals with gaming disorder (Chen et al., 2015). These enduring neuroplastic alterations may persist after the cessation of the addictive behaviour, potentially increasing vulnerability to relapse and contributing to the chronic nature of non-substance addictions.

1.3.3 *Psychological factors*

Various psychological factors play a role in the development, maintenance, and treatment of non-substance addictions. Key psychological elements contributing to the development of non-substance addictions encompass personality traits and temperament, cognitive biases and distortions, emotional regulation and coping strategies, attachment types, and early life events.

Personality Traits. Studies have consistently shown that specific personality traits and temperamental qualities are linked to a higher likelihood of developing non-substance

addictions (Huggett et al., 2021). Impulsivity is defined as a proclivity to initiate actions without careful consideration and challenges in restraining activities. Numerous studies have demonstrated elevated levels of impulsivity in those diagnosed with gambling disorder, gaming disorder, and other forms of non-substance addictions (Mackillop et al., 2016; Sanchez-Roige et al., 2019; Weiss et al., 2019). Sensation-seeking refers to the inclination to actively pursue new, diverse, and highly intense sensations and experiences. High sensation-seeking individuals may be more susceptible to participating in hazardous activities that have the potential to result in addiction (Lauriola et al., 2014). Neuroticism, marked by emotional volatility and a proclivity for negative emotions, has been linked to heightened susceptibility to both substance and non-substance addictions. It could potentially contribute to the adoption of addictive behaviors as a mechanism for managing negative emotions (Wolfers & Schneider, 2021). Although the results are inconclusive, several studies have identified positive correlations between extroversion and specific non-substance addictions, especially those that involve social aspects, such as addiction to social media (Grant & Chamberlain, 2014). Suboptimal levels of conscientiousness, encompassing characteristics such as self-control and systematic thinking, have also been associated with a heightened susceptibility to the development of non-substance addictions (Mackillop et al., 2016).

Cognitive biases and distortions. In the maintenance of addictive behaviors, cognitive biases and distortions exert a substantial influence (Arafat & Thoma, 2024). The systematic flaws in cognitive processes can impact both decision-making and behavior. Individuals suffering from non-substance addictions frequently tend to focus their attention on indicators associated with addictive behaviors. For instance, individuals with gambling disorder may have a higher propensity to perceive gambling-related stimuli in their surroundings (López-Guerrero et al, 2023). Interpretative bias refers to the inclination to interpret uncertain circumstances in a way that aligns with one's addicted tendencies. For example, an individual suffering from gaming disorder may perceive leisure time as a chance to play digital games instead of participating in other pursuits (Chia & Zhang, 2020). Individuals with addictions sometimes exhibit memory bias by having improved recall for memories associated with addiction and preferentially remembering pleasant events linked to their addictive behavior while minimizing negative effects (Mackillop et al., 2016).

Cognitive distortions refer to irrational or prejudiced cognitive processes that strengthen negative emotions and maladaptive behaviors. These irrational cognitive habits can sustain the continuation of addictive behaviors. Typical distortions in non-substance addictions encompass the illusion of control (i.e., the tendency to overestimate one's capacity to influence outcomes in situations involving chance), gambler's fallacy (i.e., the erroneous judgment that if an event has occurred more often than average in the past, it is less likely to happen in the future), and magnification of rewards/minimization of consequences (i.e., the tendency to overemphasize the positive aspects of the addictive behavior while downplaying its negative effects) (Kenton, 2019; Labrador et al., 2020;

Mackillop et al., 2016). Cognitive-behavioral therapies frequently address these biases and distortions as integral components of treatment for behavioral addictions.

Emotion dysregulation and maladaptive coping mechanisms. Standard characteristics of different non-substance addictions include challenges in regulating emotions and the use of maladaptive coping mechanisms. Persons grappling with non-substance addictions face challenges in efficiently regulating their emotions. One possible explanation for their addictive tendency is that it serves as a mechanism for regulating mood, either by intensifying positive emotions or by avoiding negative ones (Vieira, Kuss, & Griffiths, 2023; Weiss et al., 2019). The alleviation of negative emotions that addictive actions can offer serves as a powerful form of negative reinforcement, steadily reinforcing the addiction (Lauriola et al., 2014). Alexithymia, a condition marked by challenges in recognizing and articulating emotions, has been linked to certain non-substance addictions (Estévez et al., 2021). It could also lead to the adoption of addictive habits as an ineffective coping mechanism for handling unacknowledged emotional responses. A considerable number of persons suffering from non-substance addictions tend to use their addicted behavior as a mechanism for managing stress. This ineffective coping mechanism can result in a reinforcing loop in which the addiction itself becomes a cause of stress, therefore sustaining the addictive behavior (López-Guerrero et al., 2023).

Excessive Stress and maladaptive coping styles. Stresses originate from various aspects of life and can manifest as either chronic or acute. Stressors have a substantial impact on the development of non-substance addictions by generating psychological and physiological reactions that heighten susceptibility to non-substance addictions.

Similar to negative emotions, negative coping styles may affect the susceptibility to non-substance addictions in many ways. For example, extended exposure to stressful living conditions can heighten the susceptibility as persons may resort to these activities as a means of evading or managing stress (Wolfers & Schneider, 2021). The presence of financial stress and economic uncertainty might play a role in the emergence of specific addictive behaviors, such as gambling, since individuals may perceive these activities as possible remedies to their financial difficulties.

Negative Attachment Styles and Early Life Experiences. The susceptibility of an individual to acquiring non-substance addictions later in life can be greatly influenced by their attachment patterns and early life experiences. Gaining insight into the influence of these early life elements can guide both preventive measures and therapeutic strategies, emphasizing the need for early intervention and treatments initiated within the family. Attachment types characterized by insecurity, namely anxious and avoidant attachment, have been linked to a higher likelihood of developing non-substance addictions. The presence of these attachment patterns might impede the establishment of healthy relationships and the regulation of emotions, therefore increasing the likelihood of resorting to addictive behaviors as a means of coping (Eilert & Buchheim, 2023).

Empirical studies have demonstrated a robust correlation between adverse childhood experiences (such as mistreatment, disregard, or dysfunction within the home)

and the emergence of addictions, both substance and non-substance, during adulthood (Hays-Grudo et al., 2021; Leza et al., 2021). Exposure to early traumatic events can impact brain development, stress response systems, and coping strategies, therefore heightening susceptibility to addictive behaviors. Parenting styles characterized by excessive permissiveness or authoritarianism have been linked to a higher likelihood of non-substance addictions in children and adolescents. This phenomenon may be attributed to their influence on the acquisition of self-regulation abilities and coping strategies. Exposure to addictive behaviors at an early age, especially within a family setting, may heighten the likelihood of manifesting comparable addictions in the future, which can be attributed to a confluence of genetic predisposition, behavioral modeling, and the process of normalizing the addicted behavior.

1.3.4 *Societal factors*

Various social factors, including familial factors, exert a substantial influence on the development and maintenance of non-substance addictions. Social variables are crucial in influencing an individual's vulnerability to addictive behaviors and can affect the progression and intensity of the addiction. Salient socioeconomic determinants contribute to the development of non-substance addictions, including familial and peer influences, societal aspects, environmental stressors, and technological progress and availability.

Family and Peers Impact. Children born to parents who exhibit addictive tendencies are more susceptible to acquiring comparable issues. The inherent danger arises from a confluence of genetic susceptibility, acquired conduct, and the acceptance of addictive behavior as the norm. The correlation between familial and peer influences and non-substance addictions is substantial since these social contexts have a pivotal role in molding human behaviors, attitudes, and coping strategies. Adolescents, in particular, are highly susceptible to the significant impact that peer groups have on their behavior. Social approval of addictive behaviors by peers can establish these activities as the norm and enhance the probability of their participation (Huey et al., 2000). There exists a correlation between the familial environment and non-substance addictions (Donati et al., 2023; Long et al., 2016). Whether it acts as a protective factor or heightens the likelihood of acquiring the addictions is uncertain. The presence of positive elements, such as strong family unity and vigilant parental supervision, might reduce the risk, but the presence of negative elements, such as family friction and insufficient support, can heighten susceptibility. In addition, robust social support systems can operate as a safeguard against the emergence of addictive tendencies. In contrast, both social isolation and partnerships focused on addictive habits can heighten the risk (Velleman, Templeton, & Copello, 2005).

Sociocultural influences. The etiology and maintenance of non-substance addictions are significantly influenced by sociocultural variables, too. These elements form the social and cultural context in which people reside and have the potential to shape behavior by means of norms, values, and expectations. The prevalence of certain behaviors might be influenced by the cultural approval or stigma associated with particular actions. For

instance, the level of acceptance towards addictive behaviors may vary among different cultures (El Kazdouh et al., 2018; Rabinovitz & Packin2025). Non-substance addictions are also statistically associated with socioeconomic status. There is a correlation between both extremely low and extremely high socioeconomic levels and an elevated risk for specific addictive behaviors (Long et al., 2016). Socioeconomic variables might influence the accessibility of resources and levels of stress, therefore reinforcing the susceptibility to addiction (Gerra et al., 2020). Urban settings may exhibit elevated prevalence of specific non-substance addictions, perhaps attributable to enhanced availability of technology and opportunity for certain addictive behaviors. Cultural norms and traditional gender roles may shape the specific addictive behaviors that people participate in and how these actions are interpreted by society.

1.3.5 *Technological Progress and Enhanced Accessibility*

The progresses in technology and the improvement in accessibility have played a crucial role in the emergence and persistence of non-substance addictions (Arshad & Clark, 2022; Rémond & Romo, 2018). With special designs promoting dysregulated and addictive behaviors, new technologies can generate novel platforms and possibilities for initiating addictive behaviors and facilitate the engagement and addictive use of these activities by individuals (Flayelle et al., 2023). In addition, accessibility to the internet is steadily growing globally. The extensive accessibility of high-speed internet has heightened the opportunity for individuals to engage in possible online addictive activities, including gaming, gambling, social networking, cybersexual activities, online shopping, and on-demand TV streaming. The widespread presence of smartphones has further rendered possible addictive inclinations consistently available, erasing the boundaries between online and offline existence. Numerous online platforms and applications powered by the latest technologies employ gamification strategies and persuasive design to enhance user involvement, hence fostering compulsive usage habits. Exposure to targeted advertising and customized information can increase the susceptibility of vulnerable individuals to addictive behaviors (Singer, Wöhr, & Otterbach, 2024).

1.4. Summary: aetiology of non-substance addictions

Summarily, the origin of non-substance addictions is intricate and diverse, encompassing neurobiological alterations, psychological elements, societal variables, and technological progress and availability. Non-substance addictions exhibit numerous resemblances to those seen in substance addictions, therefore providing growing neurobiological and clinical evidence supporting the conceptualization of non-substance addictions as disorders involving brain-based mechanisms. Nevertheless, there exist distinct mechanisms between the two categories of addictions, particularly in terms of psychological and social processes, as well as the impacts of technological advancements. Identification and investigation of such unique processes are essential for a more in-depth understanding

of the etiology of non-substance addictions and the development of comprehensive preventive measures and successful therapies.

2. COMORBIDITY

2.1 Overview: comorbidity & dual pathology

The terms "comorbidity" and "dual pathology" (or "dual diagnosis") both denote the co-occurrence of more than one disorder in an individual, although they are employed in separate situations and possess unique definitions (Fernández-Artamendi et al., 2024; Iudici et al., 2020). Comorbidity is the coexistence of two or more chronic diseases or illnesses in a single individual, either concurrently or in succession. These conditions may manifest as either physical, mental, or a compound of both. It is a broad term used ubiquitously in several medical disciplines. As an illustration, an individual diagnosed with diabetes may also experience hypertension, therefore establishing diabetes and hypertension as comorbid disorders. While dual pathology, sometimes known as dual diagnosis, explicitly denotes the simultaneous presence of a mental disorder and an addiction in the same person (Szerman et al., 2022). This term is predominantly employed in the domains of psychiatry and addiction medicine. It emphasizes the correlation between mental disorders and addiction. The designation 'dual pathology' has been adopted by the World Psychiatric Association (WPA, 2019). Australia, Canada, Ireland, Spain, UK, USA have published guidelines to enhance services for dual pathology.

There exist two notable distinctions between the two terms (Fernández-Artamendi et al., 2024). Regarding scope, comorbidity is a comprehensive term that encompasses any concurrent medical problems, whether they are physical, mental, or both. Dual pathology delineates the precise convergence of mental health illnesses and addictions. Regarding the setting, comorbidity is more commonly employed in general medical practice, whereas dual pathology is mostly pertinent to the fields of psychiatry and addiction medicine. Accordingly, the difficulties arising from comorbidities and dual pathology are distinct. Different management and therapy approaches may be employed to tackle them. The presence of comorbidity requires a multidisciplinary strategy to effectively manage several physical and/or mental disorders. Conversely, dual pathology often necessitates the implementation of integrated treatment strategies that simultaneously target both mental health and addiction. A comprehensive grasp of these distinctions is crucial for precise diagnosis, strategic treatment planning, and effective communication among healthcare professionals.

2.2 Comorbidity of non-substance addictions

Chronic non-substance addictions frequently coincide with a range of medical illnesses, encompassing physical illnesses, concurrent mental disorders and substance use (Crane et al., 2025). Overall, the co-occurrence of non-substance addictions and available empirical

data is restricted. Understanding the comorbidities of non-substance addictions is crucial for enhancing diagnostic precision, preventative methods, treatment effectiveness, and public health policymaking. This approach enables a comprehensive healthcare strategy that acknowledges the intricate interaction between non-substance addictions, substance addictions, mental disorders, and physical health issues, ultimately resulting in improved health outcomes and increased quality of life for persons impacted by these conditions.

Different types of non-substance addictions commonly co-occur—for example, gaming disorder may coexist with gambling disorder, problematic use of social networking sites, exercise addiction, or trichotillomania (Kotyuk et al., 2020). Non-substance addictions also frequently co-occur with substance use disorders, with gambling and gaming disorders in particular repeatedly found alongside substance addictions (Ford & Håkansson, 2020; Grant & Chamberlain, 2020). Some of these comorbidities may stem from conceptual confusion or misclassification. For instance, as mentioned above, conditions like internet or smartphone addiction may reflect clusters of behaviors rather than distinct clinical disorders. Additionally, shared etiological pathways and neurobiological mechanisms may contribute to their co-occurrence. Importantly, these comorbidities may differ in nature from those involving physical illnesses or other mental disorders. While a deeper understanding of these relationships is needed to clarify the patterns of comorbidity within non-substance addictions and between non-substance and substance addictions, this chapter will not focus on such comorbidities, as this topic remains beyond its current scope.

Advancements in recent studies have enhanced our comprehension of the coexistence of non-substance addictions and physical conditions. The results underscore the complex interrelationships among potentially addictive activities, including gambling, gaming, internet use, shopping, and eating, and a range of physical impairments. Frequently occurring concurrent physical disorders seen with non-substance addictions encompass cardiovascular, gastrointestinal, and musculoskeletal illnesses. The co-occurrence of non-substance addictions with physical conditions highlights the necessity for a comprehensive treatment strategy that incorporates mental, behavioral and physical health.

Non-substance addictions often coincide with mental disorders (Fineberg et al., 2022), such as depression, anxiety disorders, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), and attention deficit hyperactivity disorder (ADHD). The interplay between non-substance addictions and mental disorders is intricate, and the coexistence of one might impact the emergence or worsening of the other. Typical co-occurrences of non-substance addictions and mental disorders may include depression in both gaming and gambling disorders, anxiety disorders in internet-related addictions, eating disorders in food addiction, obsessive-compulsive disorder (OCD) in sex-related addictions and shopping addiction, and ADHD in game disorder (di Giacomo et al., 2022; Huțul & Karner-Huțuleac, 2022; Jaiswal et al., 2020; Koncz et al., 2023; Long et al., 2024; Niedermoser et al., 2021; Pallanti et al., 2020; Rai et al., 2022; Reaz et al., 2025; Richard, 2020; Vaughan & Flack, 2022). Impulsive behaviors and an elevated susceptibility to non-substance addictions may be observed in individuals

with specific personality disorders, such as borderline personality (Collins & Grant, 2025; Kräplin et al., 2022; Smirni et al., 2023). Recognition and deeper understanding of such comorbidities are crucial for clinical management. A comprehensive treatment frequently entails addressing both the non-substance addiction and the concurrent mental disorders using integrated therapeutic methods. It is imperative for persons who are dealing with comorbid conditions to get multidisciplinary aid and support.

2.3 Common physical comorbidities involving non-substance addictions

Advancements in recent studies have enhanced our comprehension of the coexistence of non-substance addictions and physical conditions (Sinclair & Sussman, 2025; Stevens, Cooper, & Agroia, 2025). Table 1 proposes a summary of the common comorbidities between non-substance addictions and physical disorders.

Table 1. *Common Comorbid Physical Conditions of non-substance addictions*

Non-Substance Addictions	Physical Conditions	Potential Mechanisms
Gambling Disorder/ gaming disorder/ Internet addiction	Cardiovascular Disease (Abdul Rahim et al., 2023; Sinclair & Sussman, 2025)	• Increased Stress: Chronic stress from gambling addiction can lead to elevated cortisol levels and other stress-related hormones, contributing to hypertension and cardiovascular disease. • Lifestyle Factors: People with gambling addiction may engage in unhealthy behaviors such as smoking, alcohol consumption, and poor diet, further increasing cardiovascular risks.
Internet Addiction/ Gaming Disorder	Metabolic problems (obesity, metabolic syndromes, etc.) (Che Mokhtar & McGee, 2025; Ruckwongpatr et al., 2023)	• Sedentary Lifestyle: Excessive internet use often leads to physical inactivity, increasing the risk of obesity and metabolic syndrome. • Dietary Habits: Internet addiction is associated with unhealthy eating patterns, such as frequent snacking on high-calorie foods.
	Musculoskeletal Problems (Tholl et al., 2022)	• Posture and Ergonomics: Prolonged gaming sessions often lead to poor posture, repetitive strain injuries, and musculoskeletal pain, particularly in the neck, back, and wrists. • Physical Inactivity: Sedentary behavior increases the risk of obesity, diabetes, and cardiovascular diseases.
	Vision Problems (Chidi-Egboka, Jalbert, & Golebiowski, 2023; Mylona et al., 2020)	• Digital Eye Strain: Prolonged screen time can cause digital eye strain, characterized by dry eyes, blurred vision, and headaches.

Non-Substance Addictions	Physical Conditions	Potential Mechanisms
Food Addiction	Metabolic problems (obesity, diabetes, etc.) (Lerma-Cabrera, Carvajal, & Lopez-Legarrea, 2016; Meléndez-Diego et al., 2022; Nicolau et al., 2020; Zeeck et al., 2011)	• Excessive Caloric Intake: Food addiction often involves overeating high-calorie, sugary, and fatty foods, leading to obesity. • Diabetes and Metabolic Syndrome: Obesity from food addiction increases the risk of type 2 diabetes and metabolic syndrome.

Emerging research indicates that several non-substance addictions and physical health problems have common underlying mechanisms related to the dysregulation of dopamine, which impacts both the processing of rewards and physical well-being (Antons, Brand, & Potenza, 2020; Opera et al., 2021; Zack, George, & Clark, 2020). As an illustration, persistent stress caused by non-substance addictions may trigger the HPA axis, resulting in a range of physical health issues, including cardiovascular diseases, gastrointestinal disorders, and a compromised immune system. In addition, psychosocial aspects also may play an important role in the processes of comorbidity. For instance, those suffering from food addiction frequently resort to eating as a protective strategy against stress, worry, and sadness, resulting in adverse effects on their physical well-being (Fernández, Pilatti, & Pautassi, 2024). Furthermore, comparable trends are observed in other non-substance addictions, whereby maladaptive actions are employed to cope with emotional anguish or excessive stress, therefore exacerbating the decline of physical well-being (Squires et al., 2021).

Addressing comorbidity between non-substance addictions (like gambling or gaming disorder) and physical conditions requires an integrated approach that combines both psychological and medical interventions. A comprehensive evaluation by a multidisciplinary team is essential to tailor treatment to the individual's needs. Cognitive Behavioral Therapy (CBT) and other behavioral interventions help manage addictive behaviors while addressing the mental impact of physical conditions (Loya, Benitez, & Kiluk, 2023; Lopez-Fernandez et al., 2022). Simultaneously, the physical condition must be treated with appropriate medical care, focusing on non-addictive pain management and lifestyle adjustments. Continuous monitoring, patient education, and support systems are key to managing both conditions simultaneously and reducing relapse risk.

2.4 Prevention of comorbidities of non-substance addictions with physical conditions

Preventing physical comorbidities associated with non-substance addictions requires a proactive, multidimensional approach that encompasses lifestyle interventions, educational outreach, and early screening for potential health issues (Dell'Osso, et al., 2021; Rodda, 2022; Shi et al., 2022). Primary prevention strategies should focus on promoting awareness about the risks of excessive engagement in these behaviors and the associated physical health consequences. Particularly, public health campaigns can

play a crucial role in educating the public, especially younger demographics, about the importance of balanced screen time and the potential dangers of prolonged sedentary behavior, such as cardiovascular, metabolic, musculoskeletal, and vision problems.

Institutional settings, such as schools and workplaces, can implement structured programs that encourage regular breaks, physical activity, and ergonomic awareness. For instance, introducing stretching exercises or mini-breaks during long periods of computer use may help mitigate the risk of carpal tunnel syndrome, back pain, and eye strain. Additionally, promoting activities that alternate between physical and sedentary pastimes may help maintain a healthy weight and prevent metabolic conditions like diabetes.

On an individual level, healthcare providers should routinely screen for signs of non-substance addictions in their patients, especially when they present with related physical symptoms. Early identification of such behaviors allows for timely intervention, which can include counseling, therapy, and, where appropriate, referrals to specialists like dietitians or physical therapists. Personalized advice on diet, exercise, and other healthy lifestyle regimens can also prevent the onset of obesity and other health issues.

Mental health or addiction professionals can integrate modules on physical health into therapy sessions for clients with non-substance addictions, emphasizing the connection between physical activity and mental health. Programs that teach stress management techniques, such as mindfulness and relaxation exercises, can also reduce the physical symptoms exacerbated by stress, such as hypertension and gastrointestinal issues.

Furthermore, technology developers and regulators can contribute to prevention efforts by designing safer, healthier environments that encourage responsible behavioral patterns (Stevens, Delfabbro, & King, 2021). Features such as automatic reminders to take breaks or settings that limit the amount of consecutive time spent on devices or online platforms could help users maintain a healthier balance between digital and real-world activities (Fiskaali et al., 2023; Flayelle et al., 2023). These features should also account for physical health risks and inform users about the potential physical and psychological consequences of their behaviors.

2.5 Treatment of comorbidities of non-substance addictions with physical conditions

Treating comorbidities that involve non-substance addictions and physical conditions requires a multidisciplinary and integrative approach to address both the psychological and physiological aspects of these interlinked health issues. Initially, the treatment plan must encompass a thorough assessment to accurately diagnose the scope and nature of non-substance addictions, such as gaming, internet, or gambling addiction, as well as identifying all associated physical conditions, like musculoskeletal issues or metabolic disorders. This allows healthcare providers to tailor interventions that address both the addictive behaviors and the physical ailments concurrently.

For the addiction component, psychological interventions, particularly CBT, are recommended in existing guidelines (Rodda, 2022; Xiang et al., 2020). CBT may help

modify the patient's thought patterns and behaviors associated with the addiction, aiming to reduce the compulsion and improve coping strategies. Alongside psychological counseling, patients might engage in behavioral modifications that include structured schedules and reduced exposure to the addictive activity, complemented by relaxation techniques and stress management to alleviate physical symptoms exacerbated by the addiction, such as hypertension or tension headaches.

Physical ailments are treated with specific interventions based on the condition. For instance, if the patient suffers from carpal tunnel syndrome due to excessive internet use, whether through a smartphone or computer, treatment might include physical therapy, ergonomic adjustments, and possibly surgical options in severe cases. If obesity is a concern, a coordinated approach involving dietitians, physical therapists, and possibly medical treatments like medications or surgery may be necessary, focusing on achieving a healthier weight through diet modification and increased physical activity.

Additionally, it is essential to foster a supportive environment that encourages ongoing care and adherence to treatment protocols. This may include family therapy sessions to improve the home environment, participation in support groups to share experiences and coping strategies, and regular monitoring and individualized adjustments to the treatment plan by healthcare providers. Integrating consultation-liaison psychiatry into this process can enhance coordination between mental health professionals and other medical specialists, ensuring that both psychological and physical aspects of the patient's condition are addressed holistically (Carpenter, 2021). The goal is not only to treat immediate symptoms but also to promote long-term health management strategies that prevent relapse into addictive behaviors and mitigate the deterioration of physical health.

3. DUAL PATHOLOGY

3.1 Overview: dual pathology involving non-substance addictions

Dual pathology involving non-substance addictions refers to the coexistence of non-substance addictions with other mental disorders, such as gaming disorder comorbid with ADHD (Freimuth et al. 2008; Szerman et al, 2022). This condition presents unique challenges, as the addictions and mental disorders can interact in complex ways, each exacerbating the symptoms of the other. For instance, someone with an anxiety disorder might excessively engage in online gaming as a coping mechanism to alleviate their anxiety symptoms. Conversely, the compulsive behavior associated with the addiction can increase stress, potentially worsening the anxiety (Melodia, Canale, & Griffiths, 2020; Plante, et al., 2019). There might be a reciprocal causality where each condition feeds into and amplifies the other, making diagnosis and treatment more complicated. In many cases, the symptoms of a mental disorder can mask or appear similar to those of a particular addiction, leading to potential misdiagnosis or incomplete treatment. For

example, depression might be misinterpreted as withdrawal or disinterest in activities when it is a consequence of pathological gambling (Churchill & Farrell, 2018).

3.2 Potential mechanisms of dual pathology involving non-substance addictions

The dual pathology of non-substance addictions and mental disorders likely stems from shared underlying mechanisms, including genetic, neurobiological, and environmental factors. The presence of the shared risk factors can contribute to the development of both non-substance addictions and other mental disorders (Walker & Druss, 2018). Although the underlying mechanisms remain unclear, several hypotheses can be formulated based on existing literature. First, individuals with mental disorders may engage in addictive behaviors to cope with emotional distress, anxiety, or depression (Long et al., 2016; Marchica et al., 2019). In this hypothesis, the addictive behavior provides temporary relief, reinforcing the cycle and exacerbating both the addiction and the mental disorder. Second, shared neurobiological pathways, such as dysregulation of brain reward circuits, particularly involving dopamine and serotonin, are thought to underlie both addictive behaviors and psychiatric disorders like depression, anxiety, and ADHD (Yau, Leeman, & Potenza, 2020). This common neurobiological foundation may predispose individuals to develop both conditions. Third, impulsivity and poor emotional regulation might be critical underlying cognitive or personality factors, which may lead to dual pathology (Kvamme, et al., 2018; Marchica et al., 2019; Yan et al., 2016). All these hypotheses highlight the complex interaction between psychological, neurobiological, and environmental mechanisms in the development of comorbid non-substance addictions and mental disorders. Several of the mechanisms underlying dual pathology overlap with the etiological processes described in Section 1.3, particularly those involving reward circuitry, stress regulation, and impulsivity.

3.2.1 *Genetic factors*

Twin and other behavioral genetic studies conducted in the last few decades have demonstrated a significant genetic overlap between mental disorders (e.g., mood and anxiety disorders) and substance dependence (Deak & Johnson, 2021; Hatoum et al., 2022). Such overlap might also be valid for non-substance addiction. The comorbidity risk appears to be transmitted by genes involved in neural development, connection, and signaling, however the specific neuronal routes and mechanisms are yet to be fully understood. The potential genetic mechanisms underlying the dual pathology between non-substance addictions and mental disorders involve shared genetic vulnerabilities that affect brain function, behavior, and emotional regulation. Research suggests that both non-substance addictions (such as gambling or gaming disorder) and mental disorders (like depression, anxiety, or ADHD) may be influenced by genetic polymorphisms related to neurotransmitter systems, particularly those involving dopamine, serotonin, and glutamate (Grant, Brewer, & Potenza, 2006; Slutske et al., 2000; Werlin & Grünblatt, 2022;

Xian et al., 2014). Variants in genes such as dopamine receptor (DRD2) and serotonin transporter (5HTTLPR) genes have been implicated in both addictive behaviors and mood or anxiety disorders, highlighting their role in the brain's reward and emotional regulation systems. Individuals with these genetic predispositions may have altered dopamine signaling, leading to increased impulsivity, reward-seeking behaviors, and a heightened sensitivity to stress—factors that contribute to both mental disorders and addiction (Lobo & Kennedy, 2009).

Additionally, genes involved in cognitive control and executive function, such as COMT (catechol-O-methyltransferase), which influences dopamine regulation in the prefrontal cortex, may predispose individuals to both poor decision-making and heightened emotional reactivity (Grant et al., 2015). This could explain why people with ADHD or other impulse control disorders are at higher risk for developing non-substance addictions. Moreover, genetic susceptibility to stress response dysregulation, through variants in genes like CRHR1 (corticotropin-releasing hormone receptor), may amplify an individual's vulnerability to both mental health conditions and addictive behaviors (Park et al., 2018). Environmental factors, such as trauma or chronic stress, can interact with these genetic vulnerabilities through epigenetic modifications, potentially increasing the expression of genes associated with both non-substance addictions and mental disorders (Potenza, 2017). This gene-environment interaction suggests that genetic predispositions may be activated or intensified by life experiences, further increasing the likelihood of dual pathology. It needs to be highlighted that the genetic mechanisms linking non-substance addictions and mental disorders likely involve overlapping pathways related to neurotransmitter function, impulse control, emotional regulation, and stress response, creating a shared vulnerability that may manifest in both conditions.

3.2.2 *Neurobiological mechanisms*

The potential neurobiological mechanisms underlying the dual pathology between non-substance addictions and mental disorders are rooted in the dysregulation of key brain circuits, particularly those involved in reward processing, impulse control, emotional regulation, and stress response (Lopera et al., 2019; Potenza, 2017). At the core of both addiction and many mental disorders is the mesolimbic dopamine system, often referred to as the brain's "reward pathway." This system, which includes structures like the ventral tegmental area (VTA) and nucleus accumbens (NAc), mediates the feeling of pleasure or reward in response to certain behaviors. In both non-substance addictions and mental disorders, this system can become dysregulated, leading to altered reward sensitivity and an increased drive for compulsive behavior as a way to self-regulate emotions or achieve pleasure (Zhang et al., 2015; Wang et al., 2019; Tian et al., 2023).

Dopamine signaling plays a central role in both conditions. In non-substance addictions, such as gaming disorder or gambling disorder, repeated engagement in the addictive behavior causes excessive dopamine release in the NAc, reinforcing the behavior and leading to the development of compulsive patterns (Jin et al., 2016). Over

time, chronic exposure to these behaviors may result in dopamine receptor downregulation, reducing the brain's sensitivity to natural rewards (such as social interactions or hobbies) and increasing reliance on the addictive behavior to achieve the same level of reward. This neuroadaptation is also observed in substance addictions, where individuals experience "reward deficiency syndrome." Similarly, individuals with mental disorders like depression may also exhibit altered dopamine signaling, leading to anhedonia (inability to feel pleasure) and a tendency to engage in addictive behaviors to escape negative emotions.

In addition to reward circuitry, deficits in the prefrontal cortex (PFC), which is responsible for decision-making, impulse control, and executive function, are common in both non-substance addictions and mental disorders (Jin et al., 2016; Wu et al., 2020). In conditions like ADHD or obsessive-compulsive disorder (OCD), dysfunction in the PFC leads to impulsivity, poor judgment, and a lack of inhibitory control over compulsive behaviors. This inability to regulate impulses may predispose individuals to develop non-substance addictions. Furthermore, the PFC's weakened control over the reward system may allow for greater engagement in risk-taking and compulsive behaviors, perpetuating the addictive cycle.

Another key neurobiological mechanism for the dual pathology involves the stress-response system, particularly the hypothalamic–pituitary–adrenal axis (HPA axis). Chronic stress and trauma, which are commonly associated with mental disorders such as anxiety, PTSD, and depression, can lead to dysregulation of the HPA axis, resulting in heightened cortisol release and increased sensitivity to stress. This stress-induced dysregulation can drive addictive behaviors as a coping mechanism to alleviate emotional distress (Geisel et al., 2015; Kaess et al., 2017; Tsumura, Fukuda, & Kanda, 2022).

Neurotransmitters beyond dopamine may also play significant roles. Serotonin, which regulates mood and impulse control, is often disrupted in both non-substance addictions and mental disorders (Choi & Lee, 2025). Low serotonin levels have been associated with depression, anxiety, and impulsivity, contributing to the development of compulsive behaviors like excessive gaming or gambling. Similarly, glutamate, the brain's main excitatory neurotransmitter, is involved in learning, memory, and the regulation of reward behaviors. Imbalances in glutamatergic signaling can lead to heightened craving and relapse in addictive behaviors, as well as the cognitive dysfunction seen in many psychiatric conditions (Greenberg, et al., 2022).

Finally, neuroplasticity, or the brain's ability to change and adapt, is implicated in both non-substance addictions and mental disorders (Varghese, Soman, & Kumar, 2023). Chronic engagement in addictive behaviors can alter brain structure and function, particularly in areas like the PFC and striatum. These changes can reinforce the addictive cycle by creating deeply ingrained neural pathways that prioritize the addictive behavior over healthier coping strategies (Potenza, 2017). In mental disorders such as depression or PTSD, neuroplasticity is often impaired, making it harder for individuals

to adapt to stress or develop new, healthy coping mechanisms, thereby increasing vulnerability to addiction.

3.2.3 *Environmental factors*

The dual pathology between non-substance addictions and mental disorders is multifaceted and often involves complex interactions between individual vulnerabilities and external influences. Environmental factors and mechanisms can greatly contribute to the duality. Environmental mechanisms of dual pathology between non-substance addictions and mental disorders are driven by factors such as early trauma, dysfunctional family dynamics, social isolation, peer influence, socioeconomic stress, and cultural/technological influences (Potenza, 2017; Xian et al., 2014). These factors interact with individual vulnerabilities, creating a complex interplay that can lead to the co-occurrence of both mental disorders and non-substance addictions, often reinforcing each other in a cyclical pattern.

Early life experiences, such as trauma, abuse, neglect, or chronic stress, are significant environmental factors that can contribute to both the development of mental disorders and the emergence of non-substance addictions. For instance, children exposed to adverse childhood experiences may develop irrational cognitive patterns and maladaptive coping strategies, which can lead to both non-substance addictions and mental disorders (Bishop, & Younan, 2021; Lalonde et al., 2020; Pilkington, Bishop, & Younan, 2021). Similarly, family dynamics also play a crucial role in the development of both non-substance addictions and mental disorders (Ozturk, 2022). Growing up in a household where addiction, mental health conditions, or dysfunctional relationships are present can create an environment that may increase the risk of the occurrence of dual pathology. Additionally, poor parental attachment, lack of emotional support, or inconsistent discipline can contribute to emotional dysregulation and increased risk for both addiction and mental health conditions (Ghinassi & Casale, 2023; Nielsen, Favez, & Rigter, 2020; Suomi et al., 2022).

Another significant environmental mechanism is social isolation and loneliness, which are common triggers for both mental disorders and non-substance addictions (Mohamed et al., 2022). Individuals who struggle with forming social connections or who experience rejection may turn to addictive behaviors, such as excessive gaming or internet use, to fulfill their social needs in a virtual context. This reliance on virtual environments can lead to increased isolation, exacerbating feelings of loneliness and reinforcing the addictive behavior. In the meantime, social isolation has been linked to the onset of mental disorders like depression and anxiety, creating a vicious cycle where both the addiction and the mental disorders feed into each other.

Peer influence is another key factor, particularly during adolescence and young adulthood, when individuals are more susceptible to external validation and pressure. Peers who engage in or encourage excessive gaming, gambling, or other addictive behaviors can normalize these actions and make them more appealing to vulnerable individuals (Carbonneau et al., 2024; Juthamanee & Gunawan, 2021). This social reinforcement

can increase the likelihood of developing addictive behaviors, especially in individuals with underlying mental health conditions who may use these activities to escape or cope with negative emotions. Additionally, peer environments that promote high-risk behaviors, such as aggressive gaming competitions or gambling, may intensify both the addiction and related mental health challenges.

The socioeconomic status can also contribute to dual pathology. Individuals from lower socioeconomic backgrounds often face chronic stress related to financial insecurity, unemployment, and lack of access to healthcare or education. These stressors can heighten the risk of developing both mental disorders and non-substance addictions (Chen, Poon, & Cheng, 2017). People in economically disadvantaged situations may turn to gambling as a means of seeking financial relief, which can quickly spiral into a gambling disorder. Simultaneously, the stress of financial hardship can trigger or worsen mental disorders like anxiety or depression, creating a feedback loop between addiction and psychiatric symptoms (Yu & Williams, 1999). Furthermore, limited access to mental health services in such environments may make it harder to address the underlying psychological issues, allowing both conditions to worsen.

Last but not least, a few cultural and technological factors also play a role in the dual pathology of non-substance addictions and mental disorders (Flayelle et al., 2023). The rapid advancement of digital technology has increased accessibility to activities like online gaming, gambling, and social media, making it easier for individuals to engage in compulsive behaviors (WHO, 2015). In cultures where excessive screen time or competitive gaming is normalized or even glorified, individuals may be more prone to developing gaming disorders, particularly if they are already struggling with mental health conditions (Mujica, et al., 2022). In some cases, the addictive nature of online platforms is exacerbated by design features that exploit psychological vulnerabilities, such as reward systems that trigger dopamine release or algorithms that encourage prolonged engagement, contributing to both addiction and mental disorders (Flayelle et al., 2023).

3.3 Management for dual pathology including non-substance addictions

From a public health perspective, the management of dual pathology involving non-substance addictions, necessitates a thorough and integrated strategy that takes into account both the addiction and the concurrent mental disorders throughout the entire process of prevention, diagnosis, treatment, and rehabilitation (Cuartas-Arias, 2023). As in most countries, healthcare for non-substance addictions and mental health conditions is typically provided by mental health professionals. The management of such dual pathology requires a different approach from that used for comorbidities involving physical health conditions.

3.3.1 *Prevention*

Preventing dual pathology involving non-substance addictions and mental disorders requires a multifaceted approach that encompasses early intervention, education, and

support systems aimed at mitigating risk factors before they culminate in more severe issues. The primary focus should be on addressing the shared risk factors underlying both non-substance addictions and mental disorders, as outlined above (section 3.2). Primary prevention should start with public awareness campaigns that educate communities about the signs and risks of non-substance addictions such as gaming, internet, or gambling disorders alongside mental health conditions (Torales et al., 2019). Such initiatives should also aim to destigmatize these conditions and promote healthy behaviors from a young age.

In educational settings, implementing school-based programs that teach students about emotional regulation, healthy coping mechanisms, and the potential dangers of addictive behaviors can equip young people with the tools they need to navigate challenges without turning to maladaptive behaviors or mental challenges. In the family domain, parental guidance programs can be crucial. These programs help parents recognize early signs of mental distress or addictive behaviors in their children and provide strategies for fostering open communication and early intervention. On a broader societal level, community support resources such as accessible mental health services and recreational programs can provide healthy alternatives and outlets for individuals prone to addictive behaviors or those dealing with mental health conditions (Torales et al., 2019).

Healthcare providers play a critical role in the early detection and prevention of the dual pathology. Training general clinicians and mental health professionals to screen for symptoms of non-substance addictions during routine mental health assessments can lead to earlier intervention. Integrative treatment approaches that address both potential addictive behaviors and underlying mental health conditions can prevent the escalation of dual pathology. For instance, therapists might integrate cognitive-behavioral strategies with stress-reduction techniques such as mindfulness, which have proven effective in both preventing and managing addictive behaviors and enhancing mental health.

Finally, fostering a resilient environment that prioritizes mental wellness and balanced lifestyle choices is essential (Cuartas-Arias, 2023; Fernández Artamendi et al., 2024). This involves creating safe spaces for discussions about mental health and addiction, offering regular comprehensive mental health check-ups, including non-substance use components, in schools and workplaces, and ensuring that individuals have access to leisure activities that promote physical, emotional, and social well-being. By focusing on preventive measures across multiple levels of society —from individual to society— the risk of developing dual pathologies involving non-substance addictions can be significantly reduced, leading to healthier, more resilient communities.

3.3.2 *Diagnosis*

Diagnosing dual pathology involving non-substance addictions and mental disorders is a nuanced process that requires a thorough, multidisciplinary approach to accurately identify and differentiate between the overlapping symptoms of both conditions (Vitali et al., 2018). Clinicians rely on standardized diagnostic criteria from recognized

classification systems such as the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, APA) or the ICD-11 (International Classification of Diseases, WHO) to identify specific non-substance addictions like (internet) gaming disorder, gambling addiction, or other non-substance addictions, alongside any co-occurring mental disorders such as depression, anxiety, or personality disorders. Notably, the WHO provides the most comprehensive normative guidance on diagnosing both non-substance addictions and mental disorders through the *Clinical Descriptions and Diagnostic Requirements* for ICD-11 Mental, Behavioural, and Neurodevelopmental Disorders, which is instrumental in diagnosing dual pathology (WHO, 2024).

When encountering dual pathology, a key aspect of the diagnostic process is distinguishing the primary disorder from secondary behaviors or symptoms. For instance, excessive gaming might initially seem like an independent issue but could be a coping mechanism for underlying anxiety or depression. This differentiation is critical because it influences treatment choices and priorities. Clinicians must also assess the severity and chronicity of the behaviors, as well as any previous attempts at intervention and their outcomes, to understand the progression and persistence of the disorder.

Psychological evaluations often include cognitive and emotional assessments to measure aspects, such as impulse control, stress tolerance, decision-making abilities, and emotional regulation. These evaluations help to reveal any cognitive deficits or emotional dysregulation that might be contributing to both the addiction and mental health symptoms. Moreover, it's important to consider the broader psychosocial context, including family dynamics, social support systems, and any exposure to stressors or trauma, as these can significantly influence the development and maintenance of dual pathology. In some cases, collateral information from family members, educators, or previous treatment providers can offer additional insights into the individual's behaviors and symptoms over time. This information is particularly valuable when the patient might minimize or not fully recognize the extent of their addictive behaviors or mental health issues.

The diagnostic process for dual pathology is inherently complex and often requires ongoing evaluation. Initial assessments may need to be followed by periodic re-evaluations to monitor changes in the individual's dual pathology and to adjust the diagnostic understanding as treatment progresses. Given the intricate interplay between non-substance addictions and mental disorders, an accurate diagnosis is crucial for developing an effective treatment plan that addresses all facets of the individual's health needs. This process demands a careful, thoughtful approach that combines evidence-based diagnostic practices with a deep understanding of the individual's unique experiences and needs.

3.3.3 *Treatment*

Insufficient and incomplete treatment of dual pathology in patients can lead to adverse outcomes. It is often more advantageous to address both conditions simultaneously

rather than separately. Treating dual pathology involving non-substance addictions and mental disorders requires an integrated approach that addresses both the addiction and the accompanying mental health conditions simultaneously (San et al., 2016). The complexity of dual diagnosis necessitates collaboration among a diverse team of mental health professionals, including psychiatrists, psychologists, addiction specialists, and social workers, ensuring that treatment plans are comprehensive and coordinated. Typically, CBT is central to treatment, adapted to challenge and change unhealthy cognitive distortions and behaviors associated with both the addiction and the mental disorder (Geisel, Lipinski, & Kaess, 2021; Schaeuffele et al., 2021; Yip & Potenza, 2014). CBT helps patients develop healthier coping mechanisms and problem-solving skills, crucial for managing life stresses without resorting to addictive behaviors.

In addition to psychotherapy, medication-assisted treatment (MAT) can be further explored and employed, particularly for those disorders that have well-established pharmacological treatments, such as depression or anxiety (Smith, 2025). Medications may include antidepressants, mood stabilizers, or anti-anxiety drugs, tailored to the individual's specific symptoms and needs, and carefully monitored for effectiveness and potential side effects. For the addiction component, although less common in non-substance addictions, pharmacological approaches might involve medications that reduce cravings or treat underlying mood disturbances that contribute to the addiction.

Behavioral interventions are also a cornerstone of treatment, focusing on modifying the patient's environment and lifestyle to reduce triggers and encourage healthier behaviors (Brand et al., 2025). Techniques such as motivational interviewing (MI) and contingency management (CM) provide additional support and reinforcement for making positive changes. MI enhances motivation to stick with the treatment plan, while CM uses incentives to encourage abstention from addictive behaviors (Bischof, Bischof, & Rumpf, 2021; Pfund et al., 2022). Group therapy and support groups play an essential role, providing peer support and a forum for sharing experiences and strategies. These groups help reduce the isolation often felt by individuals with dual pathology and can offer insights and solidarity from others facing similar challenges. Family therapy may also be incorporated to educate family members about dual pathology, improve communication skills, and address any dysfunctional dynamics that might exacerbate the patient's conditions (Torales et al., 2019).

Continuous monitoring and long-term management are vital given the chronic nature of both non-substance addictions and mental disorders. Regular follow-up appointments allow for adjustments to the treatment plan based on the patient's progress and any new challenges that arise. Relapse prevention strategies, a key part of follow-ups, involve identifying potential triggers and developing plans to handle them without falling back into old patterns. Ultimately, treatment for dual pathology must be dynamic and patient-centered, adapting over time to meet evolving needs and circumstances. The goal should be not only to treat the comorbid disorders but also to improve the patient's overall quality of life, fostering long-term recovery and well-being.

4. FUTURE DIRECTIONS

It is of importance of deepening the understanding of non-substance addictions (Crane et al., 2025; Long, Qi, & Carragher, 2023). Future directions should focus on a range of interdisciplinary and innovative approaches that can enhance prevention strategies, diagnostic accuracy, treatment effectiveness, and sustainable recovery for non-substance addictions, as well as their co-occurring conditions, including both physical and mental ones (Fantuzzi & Mezzina, 2020; Ford & Håkansson, 2020; Fernández Artamendi et al., 2024; Gavriel-Fried et al., 2023). One critical area is enhanced neurobiological research, which involves using advanced neuroimaging techniques to map the brain's activity and structures (Ford & Håkansson, 2020). This could help clarify the neural underpinnings and pathways shared by these conditions, potentially leading to more targeted and effective treatments.

Another critical direction is genetic and epigenetic research. By identifying specific genetic markers and epigenetic changes associated with non-substance addictions, researchers could develop personalized medicine approaches that cater to the genetic profiles of individuals, thereby improving treatment outcomes. Additionally, longitudinal studies that track individuals over time can provide valuable insights into the progression and interaction of non-substance addictions and mental disorders, helping to identify critical intervention points and the long-term effects of various treatment modalities.

Integrating technology and digital tools in both research and treatment is another promising direction (Tan, Syidda, & Zhang, 2024). The utilization of m-health interventions could provide continuous, real-time data on behavior patterns, physiological responses, and environmental triggers related to addictive behaviors and mood fluctuations. This data can be invaluable for developing more dynamic and responsive treatment plans. Furthermore, virtual reality (VR) and artificial intelligence (AI) technologies offer new avenues for therapy, such as simulated environments for safe exposure and behavior modification or algorithms that predict relapse or treatment outcomes.

On the management side, there is a need for more comprehensive educational programs that not only raise awareness about non-substance addictions and their comorbidities but also teach coping and resilience skills from an early age. It is crucial to carefully assess and identify any co-occurring conditions during diagnosis for non-substance addictions. Treatment plans should be integrated to address both the addictions and their comorbid conditions (Szerman et al., 2013; Cuartas-Arias, 2023).

REFERENCES

Abdul Rahim, Y., Fernandez-Aranda, F., Jimenez-Murcia, S., & Håkansson, A. (2023). A nationwide case–control study on cardiovascular and respiratory-related disorders in patients with gambling disorder in Sweden. *Public Health*, *224*, 45–50. https://doi.org/10.1016/j.puhe.2023.08.018

Almourad, B., Mcalaney, J., Skinner, T., Pleva, M., & Ali, R. (2020). Defining digital addiction: Key features from the literature. *Psihologija*, *53*(3), 237–253. https://doi.org/10.2298/psi1910290017a

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5)* (5th ed.). American Psychiatric Publishing.

Antons, S., Brand, M., & Potenza, M. N. (2020). Neurobiology of cue-reactivity, craving, and inhibitory control in non-substance addictive behaviors. *Journal of the Neurological Sciences*, *415*, 116952. https://doi.org/10.1016/j.jns.2020.116952

Arafat, D., & Thoma, P. (2024). Impairments of Sociocognitive Functions in Individuals with Behavioral Addictions: A Review Article. *Journal of Gambling Studies*, *40*(2), 429–451. https://doi.org/10.1007/s10899-023-10227-w

Arshad, F., & Clark, L. (2022). Immersion in Substance-Related and Behavioural Addictions: Neural Systems and Neurochemical Substrates. *Current Behavioral Neuroscience Reports*, *9*(1), 1–10. https://doi.org/10.1007/s40473-021-00242-9

Ayala-Rojas, RE., Granero, R., Fernández-Aranda, F. *et al*. Online Gaming Disorder and Sports Betting Addiction: Convergences and Divergences. *Int J Ment Health Addiction* (2024). https://doi.org/10.1007/s11469-024-01386-x

Bischof, G., Bischof, A., & Rumpf, H.-J. (2021). Motivational interviewing: an evidence-based Approach for Use in Medical Practice. *Deutsches Aerzteblatt Online*, *118*(7), 109–115. https://doi.org/10.3238/arztebl.m2021.0014

Blanco, C., Petkova, E., Ibañez, A., & Saiz-Ruiz, J. (2002). A Pilot Placebo-Controlled Study of Fluvoxamine for Pathological Gambling. *Annals of Clinical Psychiatry*, *14*(1), 9–15. https://doi.org/10.3109/10401230209147393

Blum, K., Thanos, P., & Oscar-Berman, M. (2015). Dopamine in the Brain: Hypothesizing Surfeit or Deficit Links to Reward and Addiction. *Journal of Reward Deficiency Syndrome*, *01*(03). https://doi.org/10.17756/jrds.2015-016

Boileau, I., Payer, D., Chugani, B., Lobo, D., Behzadi, A., Rusjan, P. M., ... Zack, M. (2013). The D2/3dopamine receptor in pathological gambling: a positron emission tomography study with [11C]-(+)-propyl-hexahydro-naphtho-oxazin and [11C]raclopride. *Addiction*, *108*(5), 953–963. https://doi.org/10.1111/add.12066

Brand, M., Antons, S., Bőthe, B., Demetrovics, Z., Fineberg, N. A., Jimenez-Murcia, S., ... Potenza, M. N. (2025). Current Advances in Behavioral Addictions: From Fundamental Research to Clinical Practice. *The American Journal of Psychiatry*, *182*(2), 155–163. https://doi.org/10.1176/appi.ajp.20240092

Brand, M., Snagowski, J., Laier, C., & Maderwald, S. (2016). Ventral striatum activity when watching preferred pornographic pictures is correlated with symptoms of Internet pornography addiction. *NeuroImage*, *129*, 224–232. https://doi.org/10.1016/j.neuroimage.2016.01.033

Brevers, D., Noël, X., He, Q., Melrose, J. A., & Bechara, A. (2016). Increased ventral-striatal activity during monetary decision making is a marker of problem poker gambling severity. *Addiction Biology*, *21*(3), 688–699. https://doi.org/10.1111/adb.12239

Carbonneau, R., Vitaro, F., Brendgen, M., Boivin, M., Côté, S. M., & Tremblay, R. E. (2024). Differential Association of Preadolescent Risk Factors Across Developmental Patterns of Adolescent Concurrent Gambling Participation and Substance Use. *Journal of Gambling Studies*, *40*(4), 1965–1985. https://doi.org/10.1007/s10899-024-10358-8

Carpenter, L. J., Bautovich, A., Sharma, S., Gatsi, M., & Wand, A. P. F. (2021). The development of pathways for responding to patient complexity in a liaison psychiatry setting. *Australasian psychiatry: bulletin of Royal Australian and New Zealand College of Psychiatrists*, *29*(3), 256-260. https://doi.org/10.1177/1039856220937648

Che Mokhtar, M., & McGee, R. (2025). Impact of internet addiction and gaming disorder on body weight in children and adolescents: A systematic review. *Journal of Paediatrics and Child Health*, *61*(2), 136–147. https://doi.org/10.1111/jpc.16726

Chen, C.-Y., Huang, M.-F., Yen, J.-Y., Chen, C.-S., Liu, G.-C., Yen, C.-F., & Ko, C.-H. (2015). Brain correlates of response inhibition in Internet gaming disorder. *Psychiatry and Clinical Neurosciences*, *69*(4), 201–209. https://doi.org/10.1111/pcn.12224

Chen, Z., Poon, K.-T., & Cheng, C. (2017). Deficits in recognizing disgust facial expressions and Internet addiction: Perceived stress as a mediator. *Psychiatry Research*, *254*, 211–217. https://doi.org/10.1016/j.psychres.2017.04.057

Chia, D. X. Y., & Zhang, M. W. B. (2020). A Scoping Review of Cognitive Bias in Internet Addiction and Internet Gaming Disorders. *International Journal of Environmental Research and Public Health*, *17*(1), 373. https://doi.org/10.3390/ijerph17010373

Chidi-Egboka, N. C., Jalbert, I., & Golebiowski, B. (2023). Smartphone gaming induces dry eye symptoms and reduces blinking in school-aged children. *Eye*, *37*(7), 1342–1349. https://doi.org/10.1038/s41433-022-02122-2

Choi, J. M., & Lee, E. J. (2025). Association Among Depressive Symptoms, Physical Symptoms, Serotonin Levels, and Gambling Disorder: A Case-Control Study. *Journal of Psychosocial Nursing and Mental Health Services*, 1–10. https://doi.org/10.3928/02793695-20250415-03

Churchill, S. A., & Farrell, L. (2018). The impact of gambling on depression: New evidence from England and Scotland. *Economic Modelling*, *68*, 475-483. https://doi.org/10.1016/j.econmod.2017.08.021

Clark, L., Crooks, B., Clarke, R., Aitken, M. R. F., & Dunn, B. D. (2012). Physiological Responses to Near-Miss Outcomes and Personal Control During Simulated Gambling. *Journal of Gambling Studies*, *28*(1), 123–137. https://doi.org/10.1007/s10899-011-9247-z

Collins, M., & Grant, J. E. (2025). Social media addiction and borderline personality disorder: a survey study. *Frontiers in Psychiatry*, *15*. https://doi.org/10.3389/fpsyt.2024.1459827

Crane, K., Carman Copel, L., Domoff, S. E., Weissinger, G., Bernhardt, P., & Yost, J. (2025). Behavioural Addiction: A Concept Analysis. *Journal of Advanced Nursing*, (Advance online publication.). https://doi.org/10.1111/jan.16969

Cuartas-Arias, M. (2023). Exploring Dual Pathology: Opportunities and Challenges. *International Journal of Psychological Research*, *16*(1), 1–4. https://doi.org/10.21500/20112084.6405

Deak, J. D., & Johnson, E. C. (2021). Genetics of Substance Use disorders: a Review. *Psychological Medicine*, *51*(13), 1–12. https://doi.org/10.1017/s0033291721000969

Dell'Osso, B., Di Bernardo, I., Vismara, M., Piccoli, E., Giorgetti, F., Molteni, L., ... Viganò, C. (2021). Managing Problematic Usage of the Internet and Related Disorders in an Era of Diagnostic Transition: An Updated Review. *Clinical Practice & Epidemiology in Mental Health*, *17*(1), 61–74. https://doi.org/10.2174/1745017902117010061

di Giacomo, E., Aliberti, F., Pescatore, F., Santorelli, M., Pessina, R., Placenti, V., ... Clerici, M. (2022). Disentangling binge eating disorder and food addiction: a systematic review and meta-analysis. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, *27*(6), 1963–1970. https://doi.org/10.1007/s40519-021-01354-7

Donati, M. A., Beccari, C., Sanson, F., Iraci Sareri, G., & Primi, C. (2023). Parental gambling frequency and adolescent gambling: A cross-sectional path model involving adolescents and parents. *PLOS ONE*, *18*(2), e0280996. https://doi.org/10.1371/journal.pone.0280996

Eilert, D. W., & Buchheim, A. (2023). Attachment-Related Differences in Emotion Reg-

ulation in Adults: a Systematic Review on Attachment Representations. *Brain Sciences*, *13*(6), 884–884. https://doi.org/10.3390/brainsci13060884

El Kazdouh, H., El-Ammari, A., Bouftini, S., El Fakir, S., & El Achhab, Y. (2018). Adolescents, parents and teachers' perceptions of risk and protective factors of substance use in Moroccan adolescents: a qualitative study. *Substance Abuse Treatment, Prevention, and Policy*, *13*(1). https://doi.org/10.1186/s13011-018-0169-y

Estévez, A., Jauregui, P., Macía, L., & López-González, H. (2021). Gambling and attachment: The mediating role of alexithymia in adolescents and young adults. *Journal of Gambling Studies*, *37*, 497-514. https://doi.org/10.1007/s10899-020-09965-y

Fantuzzi, C., & Mezzina, R. (2020). Dual diagnosis: A systematic review of the organization of community health services. *International Journal of Social Psychiatry*, *66*(3), 300–310. https://doi.org/10.1177/0020764019899975

Fernández, M. S., Pilatti, A., & Pautassi, R. M. (2022). Eating-to-Cope Motives and Uncontrolled Eating as Mediators Between Negative Emotional States and Food Addiction Among Argentinean Young Adults. *International Journal of Mental Health and Addiction*, *22*(3), 1433–1451. https://doi.org/10.1007/s11469-022-00934-7

Fernández-Artamendi, S., Menéndez, G. F., María-Teresa Cortés-Tomás, & Salvador, F. (2024). Dual pathology? Reviewing the conceptualization of comorbidity in addictions. *Adicciones*, *36*(1), 3–10. https://doi.org/10.20882/adicciones.2053

Fineberg, N. A., Menchón, J. M., Hall, N., Dell'Osso, B., Brand, M., Potenza, M. N., … King, D. L. (2022). Advances in problematic usage of the internet research – A narrative review by experts from the European network for problematic usage of the internet. *Comprehensive Psychiatry*, *118*, 152346. https://doi.org/10.1016/j.comppsych.2022.152346

Fiskaali, A., Stenbro, A. W., Marcussen, T., & Rask, M. T. (2023). Preventive Interventions and Harm Reduction in Online and Electronic Gambling: A Systematic Review. *Journal of Gambling Studies*, *39*(2), 883–911. https://doi.org/10.1007/s10899-022-10126-6

Flayelle, M., Brevers, D., King, D. L., Maurage, P., Perales, J. C., & Billieux, J. (2023). A taxonomy of technology design features that promote potentially addictive online behaviours. *Nature Reviews Psychology*, *2*(3), 136–150. https://doi.org/10.1038/s44159-023-00153-4

Ford, M., & Håkansson, A. (2020). Problem gambling, associations with comorbid health conditions, substance use, and behavioural addictions: Opportunities for pathways to treatment. *PLOS ONE*, *15*(1), e0227644. https://doi.org/10.1371/journal.pone.0227644

Freimuth, M., Waddell, M., Stannard, J., Kelley, S., Kipper, A., Richardson, A., & Szuromi, I. (2008). Expanding the Scope of Dual Diagnosis and Co-Addictions: Behavioral Addictions. *Journal of Groups in Addiction & Recovery*, *3*(3-4), 137–160. https://doi.org/10.1080/15560350802424944

García-Castro, J., Cancela, A., & Cárdaba, M. A. M. (2022). Neural cue-reactivity in pathological gambling as evidence for behavioral addiction: a systematic review. *Current Psychology*. https://doi.org/10.1007/s12144-022-03915-0

Gavriel-Fried, B., Serry, M., Katz, D., Dorottya Hidvégi, Zsolt Demetrovics, & Orsolya Király. (2023). The concept of recovery in gaming disorder: A scoping review. *Journal of Behavioral Addictions*, *12*(1), 26–52. https://doi.org/10.1556/2006.2023.00002

Geisel, O., Lipinski, A., & Kaess, M. (2021). Non-substance addiction in childhood and adolescence—the Internet, computer games and social media. *Deutsches Aerzteblatt Online*, *118*(1-2), 14–22. https://doi.org/10.3238/arztebl.m2021.0002

Geisel, O., Panneck, P., Hellweg, R., Wiedemann, K., & Müller, C. (2015). Hypothalamic–pituitary–adrenal axis activity in patients with pathological gambling and internet use disorder. *Psychiatry Research*, *226*(1), 97–102. https://doi.org/10.1016/j.psychres.2014.11.078

Gerra, G., Benedetti, E., Resce, G., Potente, R., Cutilli, A., & Molinaro, S. (2020). Socioeconomic Status, Parental Education, School

Connectedness and Individual Socio-Cultural Resources in Vulnerability for Drug Use among Students. *International Journal of Environmental Research and Public Health*, *17*(4), 1306. https://doi.org/10.3390/ijerph17041306

Ghinassi, S., & Casale, S. (2023). The Role of Attachment in Gambling Behaviors and Gambling Disorder: A Systematic Review. *Journal of Gambling Studies*, *39*(2), 713–749. https://doi.org/10.1007/s10899-022-10163-1

Goel, A., Jaiswal, A., Manchanda, S., Gautam, V., Aneja, J., & Raghav, P. (2020). Burden of internet addiction, social anxiety and social phobia among University students, India. *Journal of Family Medicine and Primary Care*, *9*(7), 3607. https://doi.org/10.4103/jfmpc.jfmpc_360_20

Gola, M., & Potenza, M. N. (2016). Paroxetine Treatment of Problematic Pornography Use: A Case Series. *Journal of Behavioral Addictions*, *5*(3), 529–532. https://doi.org/10.1556/2006.5.2016.046

Goldstein, R. Z., & Volkow, N. D. (2011). Dysfunction of the prefrontal cortex in addiction: neuroimaging findings and clinical implications. *Nature Reviews Neuroscience*, *12*(11), 652–669. https://doi.org/10.1038/nrn3119

Grant, J. E., Brewer, J. A., & Potenza, M. N. (2006). The Neurobiology of Substance and Behavioral Addictions. *CNS Spectrums*, *11*(12), 924–930. https://doi.org/10.1017/s109285290001511x

Grant, J. E., & Chamberlain, S. R. (2014). Impulsive action and impulsive choice across substance and behavioral addictions: Cause or consequence? *Addictive Behaviors*, *39*(11), 1632–1639. https://doi.org/10.1016/j.addbeh.2014.04.022

Grant, J. E., & Chamberlain, S. R. (2015). Gambling disorder and its relationship with substance use disorders: Implications for nosological revisions and treatment. *The American Journal on Addictions*, *24*(2), 126–131. https://doi.org/10.1111/ajad.12112

Grant, J. E., & Chamberlain, S. R. (2020). Gambling and substance use: Comorbidity and treatment implications. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *99*, 109852. https://doi.org/10.1016/j.pnpbp.2019.109852

Grant, J. E., Leppink, E. W., Redden, S. A., Odlaug, B. L., & Chamberlain, S. R. (2015). COMT genotype, gambling activity, and cognition. *Journal of Psychiatric Research*, *68*, 371–376. https://doi.org/10.1016/j.jpsychires.2015.04.029

Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to Behavioral Addictions. *The American Journal of Drug and Alcohol Abuse*, *36*(5), 233–241. https://doi.org/10.3109/00952990.2010.491884

Greenberg, N. R., Farhadi, F., Kazer, B., Potenza, M. N., & Angarita, G. A. (2022). The Potential of N-acetyl Cysteine in Behavioral Addictions and Related Compulsive and Impulsive Behaviors and Disorders: a Scoping Review. *Current Addiction Reports*, *9*(4), 660–670. https://doi.org/10.1007/s40429-022-00446-3

Gyollai, A., Griffiths, M., Barta, C., Vereczkei, A., Urban, R., Kun, B., … Demetrovics, Z. (2014). The Genetics of Problem and Pathological Gambling: A Systematic Review. *Current Pharmaceutical Design*, *20*(25), 3993–3999. https://doi.org/10.2174/13816128113199990626

Hatoum, A. S., Johnson, E. C., Colbert, S. M. C., Polimanti, R., Zhou, H., Walters, R. K., … Agrawal, A. (2022). The addiction risk factor: A unitary genetic vulnerability characterizes substance use disorders and their associations with common correlates. *Neuropsychopharmacology*, *47*(10), 1739–1745. https://doi.org/10.1038/s41386-021-01209-w

Hays-Grudo, J., Morris, A. S., Ratliff, E. L., & Croff, J. M. (2021). Adverse Childhood Experiences and Addiction. *Emerging Issues in Family and Individual Resilience*, 91–108. https://doi.org/10.1007/978-3-030-56958-7_5

Huey, S. J., Henggeler, S. W., Brondino, M. J., & Pickrel, S. G. (2000). Mechanisms of change in multisystemic therapy: Reducing delinquent behavior through therapist adherence and improved family and peer functioning. *Journal of Consulting and Clinical Psychology*, *68*(3), 451–467. https://doi.org/10.1037/0022-006x.68.3.451

Huggett, S. B., Winiger, E. A., Palmer, R. H. C., Hewitt, J. K., Corley, R. P., & Stallings, M. C.

(2021). The structure and subtypes of gambling activities: Genetic, psychiatric and behavioral etiologies of gambling frequency. *Addictive Behaviors*, *113*, 106662. https://doi.org/10.1016/j.addbeh.2020.106662

Huțul, T.-D., & Karner-Huțuleac, A. (2022). The Level of Gambling Prediction Using Depression and Anxiety in the Romanian Population. *Journal of Gambling Studies*, *38*(2), 653–662. https://doi.org/10.1007/s10899-021-10051-0

Iudici, A., Girolimetto, R., Volponi, G., & Eletto, A. (2020). Dual Diagnosis and Application Problems in the Use of the Construct. *The Journal of Nervous and Mental Disease*, *208*(3), 181–189. https://doi.org/10.1097/nmd.0000000000001092

James, R. J. E., Dixon, G., Dragomir, M.-G., Thirlwell, E., & Hitcham, L. (2023). Understanding the construction of "behavior" in smartphone addiction: A scoping review. *Addictive Behaviors*, *137*, 107503. https://doi.org/10.1016/j.addbeh.2022.107503

Jaiswal, A., Manchanda, S., Gautam, V., Goel, A. D., Aneja, J., & Raghav, P. R. (2020). Burden of internet addiction, social anxiety and social phobia among University students, India. *Journal of family medicine and primary care*, *9*(7), 3607-36 12. https://doi.org/10.4103/jfmpc.jfmpc_360_20

Jin, C., Zhang, T., Cai, C., Bi, Y., Li, Y., Yu, D., ... Yuan, K. (2016). Abnormal prefrontal cortex resting state functional connectivity and severity of internet gaming disorder. *Brain Imaging and Behavior*, *10*(3), 719–729. https://doi.org/10.1007/s11682-015-9439-8

Juthamanee, S., & Gunawan, J. (2021). Factors related to Internet and game addiction among adolescents: A scoping review. *Belitung Nursing Journal*, *7*(2), 62. https://doi.org/10.33546/bnj.1192

Kaess, M., Parzer, P., Mehl, L., Weil, L., Strittmatter, E., Resch, F., & Koenig, J. (2017). Stress vulnerability in male youth with Internet Gaming Disorder. *Psychoneuroendocrinology*, *77*, 244–251. https://doi.org/10.1016/j.psyneuen.2017.01.008

Kenton, W. (2019). Gambler's Fallacy Definition. Retrieved from Investopedia website: https://www.investopedia.com/terms/g/gamblersfallacy.asp

Koncz, P., Demetrovics, Z., Takacs, Z. K., Griffiths, M. D., Nagy, T., & Király, O. (2023). The emerging evidence on the association between symptoms of ADHD and gaming disorder: A systematic review and meta-analysis. *Clinical Psychology Review*, *106*, 102343. https://doi.org/10.1016/j.cpr.2023.102343

Kotyuk, E., Magi, A., Eisinger, A., Király, O., Vereczkei, A., Barta, C., ... Demetrovics, Z. (2020). Co-occurrences of substance use and other potentially addictive behaviors: Epidemiological results from the Psychological and Genetic Factors of the Addictive Behaviors (PGA) Study. *Journal of Behavioral Addictions*, *9*(2), 272–288. https://doi.org/10.1556/2006.2020.00033

Kräplin, A., Kupka, K. F., Fröhner, J. H., Krönke, K.-M., Wolff, M., Smolka, M. N., ... Goschke, T. (2022). Personality Traits Predict Non-Substance Related and Substance Related Addictive Behaviours. *SUCHT*, *68*(5), 263–277. https://doi.org/10.1024/0939-5911/a000780

Labrador, M., Labrador, F. J., Crespo, M., Echeburúa, E., & Becoña, E. (2020). Cognitive Distortions in Gamblers and Non-gamblers of a Representative Spanish Sample. *Journal of Gambling Studies*, *36*(1), 207–222. https://doi.org/10.1007/s10899-019-09870-z

Lalonde, G., Bernier, A., Beaudoin, C., Gravel, J., & Beauchamp, M. H. (2020). Factors contributing to parent–child interaction quality following mild traumatic brain injury in early childhood. *Journal of Neuropsychology*, *14*(1), 98–120. https://doi.org/10.1111/jnp.12179

Lauriola, M., Panno, A., Levin, I. P., & Lejuez, C. W. (2014). Individual Differences in Risky Decision Making: A Meta-analysis of Sensation Seeking and Impulsivity with the Balloon Analogue Risk Task. *Journal of Behavioral Decision Making*, *27*(1), 20–36. https://doi.org/10.1002/bdm.1784

Lerma-Cabrera, J. M., Carvajal, F., & Lopez-Legarrea, P. (2016). Food addiction as a new piece of the obesity framework. *Nutrition Journal*, *15*(5), 5. https://doi.org/10.1186/s12937-016-0124-6

Leza, L., Siria, S., López-Goñi, J. J., & Fernández-Montalvo, J. (2021). Adverse childhood experiences (ACEs) and substance use disorder (SUD): A scoping review. *Drug and Alcohol Dependence*, *221*(1), 108563. https://doi.org/10.1016/j.drugalcdep.2021.108563

Li, D., Yang, Y., Li, Y., Zhu, X., & Li, Z. (2021). Epigenetic regulation of gene expression in response to environmental exposures: From bench to model. *Science of the Total Environment*, *776*, 145998. https://doi.org/10.1016/j.scitotenv.2021.145998

Lobo, D. S. S., & Kennedy, J. L. (2006). The Genetics of Gambling and Behavioral Addictions. *CNS Spectrums*, *11*(12), 931–939. https://doi.org/10.1017/s1092852900015121

Lobo, D. S. S., & Kennedy, J. L. (2009). Genetic aspects of pathological gambling: a complex disorder with shared genetic vulnerabilities. *Addiction*, *104*(9), 1454–1465. https://doi.org/10.1111/j.1360-0443.2009.02671.x

Long, J., Liu, T.-Q., Liao, Y.-H., Qi, C., He, H.-Y., Chen, S.-B., & Billieux, J. (2016). Prevalence and correlates of problematic smartphone use in a large random sample of Chinese undergraduates. *BMC Psychiatry*, *16*(1). https://doi.org/10.1186/s12888-016-1083-3

Long, J., Liu, Y., Wang, Y., Pottié, A., Aurélien Cornil, Jory Deleuze, … Joël Billieux. (2024). The Mediating Effects of Perceived Family Support in the Relationship Between Anxiety and Problematic Smartphone Use. *The Journal of Nervous and Mental Disease*, *212*(2), 76–83. https://doi.org/10.1097/nmd.0000000000001738

Long, J., Qi, C., & Carragher, N. (2023). Editorial: Deepening our understanding of the etiology of gaming disorder and gambling disorder. *Frontiers in Psychiatry*, *14*. https://doi.org/10.3389/fpsyt.2023.1266531

Lopera, R. E., Hurtado, A. R., Gonzalez, V. V., Arbeláez, J. F., Castaño, G. A., Buitrago, C., & Arbeláez, S. G. (2019). Cognitive Impairment in Patients With Dual Pathology. *Addictive Disorders & Their Treatment*, *18*(1), 53–57. https://doi.org/10.1097/adt.0000000000000150

Lopez-Fernandez, O., Romo, L., Kern, L., Rousseau, A., Graziani, P., Rochat, L., … Kuss, D. J. (2022). Perceptions Underlying Addictive Technology Use Patterns: Insights for Cognitive-Behavioural Therapy. *International Journal of Environmental Research and Public Health*, *19*(1), 544. https://doi.org/10.3390/ijerph19010544

López-Guerrero, J., Navas, J. F., Perales, J. C., Rivero, F. J., & Muela, I. (2023). The Interrelation Between Emotional Impulsivity, Craving, and Symptoms Severity in Behavioral Addictions and Related Conditions: A Theory-Driven Systematic Review. *Current Addiction Reports*, *10*(4), 718–736. https://doi.org/10.1007/s40429-023-00512-4

Loya, J. M., Benitez, B., & Kiluk, B. D. (2023). The Effect of Cognitive Behavioral Therapy on Impulsivity in Addictive Disorders: a Narrative Review. *Current Addiction Reports*, *10*(3), 485–493. https://doi.org/10.1007/s40429-023-00491-6

MacKillop, J., Weafer, J., C. Gray, J., Oshri, A., Palmer, A., & de Wit, H. (2016). The latent structure of impulsivity: impulsive choice, impulsive action, and impulsive personality traits. *Psychopharmacology*, *233*(18), 3361–3370. https://doi.org/10.1007/s00213-016-4372-0

Marchica, L. A., Mills, D. J., Derevensky, J. L., & Montreuil, T. C. (2019). The Role of Emotion Regulation in Video Gaming and Gambling Disorder. *The Canadian Journal of Addiction*, *10*(4), 19–29. https://doi.org/10.1097/cxa.0000000000000070

Meléndez-Diego, K. S., Mendiola-Pastrana, I. R., López-Ortiz, E., Romero-Henríquez, L. F., Guízar-Sánchez, D. P., Cervantes Zentella, A. G., & López-Ortiz, G. (2022). Food addiction and metabolic diseases. *Alad*, *12*(1). https://doi.org/10.24875/alad.21000027

Melodia, F., Canale, N., & Griffiths, M. D. (2020). The role of avoidance coping and escape motives in problematic online gaming: A systematic literature review. *International Journal of Mental Health and Addiction*, *20*(2). https://doi.org/10.1007/s11469-020-00422-w

Mohamed, M. S., Rukh, G., Schiöth, H. B., Vadlin, S., Olofsdotter, S., Åslund, C., & Nilsson, K. W. (2022). Worsened Anxiety and Loneliness Influenced Gaming and Gambling during the COVID-19 Pandemic. *Journal of Clinical*

Medicine, *12*(1), 249. https://doi.org/10.3390/jcm12010249

Mujica, A., Crowell, C., Villano, M., & Uddin, K. (2022). Addiction by design: Some dimensions and challenges of excessive social media use. *Medical Research Archives*, *10*(2), 1–29. https://doi.org/10.18103/mra.v10i2.2677

Mylona, I., Deres, E. S., Dere, G.-D. S., Tsinopoulos, I., & Glynatsis, M. (2020). The Impact of Internet and Videogaming Addiction on Adolescent Vision: A Review of the Literature. *Frontiers in Public Health*, *8*, 63. https://doi.org/10.3389/fpubh.2020.00063

Nicolau, J., Romerosa, J. M., Rodríguez, I., Sanchís, P., Bonet, A., Arteaga, M., … Masmiquel, L. (2020). Associations of food addiction with metabolic control, medical complications and depression among patients with type 2 diabetes. *Acta Diabetologica*, *57*(9), 1093–1100. https://doi.org/10.1007/s00592-020-01519-3

Niedermoser, D. W., Petitjean, S., Schweinfurth, N., Wirz, L., Ankli, V., Schilling, H., … Walter, M. (2021). Shopping addiction: A brief review. *Practice Innovations*, *6*(3), 199. https://doi.org/10.1037/pri0000152

Nielsen, P., Favez, N., & Rigter, H. (2020). Parental and Family Factors Associated with Problematic Gaming and Problematic Internet Use in Adolescents: a Systematic Literature Review. *Current Addiction Reports*, *7*, 365–386. https://doi.org/10.1007/s40429-020-00320-0

Olsen, C. M. (2011). Natural Rewards, Neuroplasticity, and Non-Drug Addictions. *Neuropharmacology*, *61*(7), 1109–1122. https://doi.org/10.1016/j.neuropharm.2011.03.010

Oprea, D.-C., Moldovan, M.-A., Chiriță, R., & Boloș, A. (2021). Behavioural addictions and the role of dopamine. *Bulletin of Integrative Psychiatry*, *91*(4), 64–71. https://doi.org/10.36219/bpi.2021.4.05

Ozturk, E. (2022). Dysfunctional generations versus natural and guiding parenting style: Intergenerational transmission of trauma and intergenerational transfer of psychopathology as dissociogenic agents. *Medicine Science | International Medical Journal*, *11*(2), 886. https://doi.org/10.5455/medscience.2022.04.090

Pallanti, S., & Salerno, L. (2020). *The burden of adult ADHD in comorbid psychiatric and neurological disorders* (pp. 271–286). Cham: Springer.

Park, J., Sung, J.-Y., Kim, D.-K., Kong, I. D., Hughes, T. L., & Kim, N. (2018). Genetic association of human Corticotropin-Releasing Hormone Receptor 1 (CRHR1) with Internet gaming addiction in Korean male adolescents. *BMC Psychiatry*, *18*(1), 396. https://doi.org/10.1186/s12888-018-1974-6

Pfund, R. A., Ginley, M. K., Rash, C. J., & Zajac, K. (2022). Contingency management for treatment attendance: A meta-analysis. *Journal of Substance Abuse Treatment*, *133*, 108556. https://doi.org/10.1016/j.jsat.2021.108556

Pilkington, P. D., Bishop, A., & Younan, R. (2021). Adverse childhood experiences and early maladaptive schemas in adulthood: a systematic review and meta-analysis. *Clinical Psychology & Psychotherapy*, *28*(3), 569–584. https://doi.org/10.1002/cpp.2533

Plante, C. N., Gentile, D. A., Groves, C. L., Modlin, A., & Blanco-Herrera, J. (2019). Video games as coping mechanisms in the etiology of video game addiction. *Psychology of Popular Media Culture*, *8*(4), 385. https://doi.org/10.1037/ppm0000186

Potenza , M. N. (2017). Clinical neuropsychiatric considerations regarding nonsubstance or behavioral addictions. *Dialogues in Clinical Neuroscience*, *19*(3), 281–291. https://doi.org/10.31887/DCNS.2017.19.3/mpotenza

Potenza, M. N. (2013). Non-substance addictive behaviors in the context of DSM-5. *Addictive Behaviors*, *39*(1), 1–2. https://doi.org/10.1016/j.addbeh.2013.09.004

Rabinovitz, S., & Packin, N. G. (2025). All Bets Are On: Addiction, Prediction, Regulation, and the Future of Financial Gambling. Retrieved June 24, 2025, from Ssrn.com website: https://ssrn.com/abstract=5230328

Rahim, Y. A., Fernández-Aranda, F., Jiménez-Murcia, S., & Håkansson, A. (2023). A nationwide case–control study on cardiovascular and respiratory-related disorders in patients with gambling disorder in Sweden. Public Health, 224, 45-50. https://doi.org/10.1016/j.puhe.2023.08.018

Rai, D., Jaisoorya, T. S., Narayanaswamy, J. C., Arumugham, S. S., & Janardhan Reddy, Y. C. (2022). Behavioural addictions in obsessive compulsive disorder – Prevalence and clinical correlates. *Psychiatry Research Communications*, *2*(1), 100016. https://doi.org/10.1016/j.psycom.2021.100016

Reaz, M. T., Dada, M., Ahamad, S., Shahriar, F. M., & Ribero, J. J. (2025). The Impact of Obsessive-Compulsive Disorder (OCD) on Customer's Impulse Buying Behavior Factors. *Studies in Big Data*, *2*, 81–92. https://doi.org/10.1007/978-3-031-83915-3_7

Rémond, J.-J., & Romo, L. (2018). Analysis of Gambling in the Media Related to Screens: Immersion as a Predictor of Excessive Use? *International Journal of Environmental Research and Public Health*, *15*(1). https://doi.org/10.3390/ijerph15010058

Richard, J., Fletcher, É., Boutin, S., Derevensky, J., & Temcheff, C. (2020). Conduct problems and depressive symptoms in association with problem gambling and gaming: A systematic review. *Journal of Behavioral Addictions*, *9*(3), 497–533. https://doi.org/10.1556/2006.2020.00045

Rodda, S. N. (2022). A Systematic Review of Internet Delivered Interventions for Gambling: Prevention, Harm Reduction and Early Intervention. *Journal of Gambling Studies*, *38*(3), 967–991. https://doi.org/10.1007/s10899-021-10070-x

Rozgonjuk, D., Schivinski, B., Pontes, H. M., & Montag, C. (2021). Problematic Online Behaviors Among Gamers: the Links Between Problematic Gaming, Gambling, Shopping, Pornography Use, and Social Networking. *International Journal of Mental Health and Addiction*, *21*(1), 240–257. https://doi.org/10.1007/s11469-021-00590-3

Ruckwongpatr Kamolthip, Yang, Y., Latner, J. D., O'Brien, K., Chang, Y.-L., Lin, C.-C., … Lin, C. (2023). The effect of time spent sitting and excessive gaming on the weight status, and perceived weight stigma among Taiwanese young adults. *Heliyon*, *9*(3), e14298–e14298. https://doi.org/10.1016/j.heliyon.2023.e14298

Sağlam, M., & Karanfiloğlu, M. (2022). Digital games and advertising: A qualitative research on monetizing e-sports activities. EKEV Akademi Dergisi, (89), 157-176.

San, L., Arranz, B., Dual Pathology Clinical Practice Guide EG, Arrojo, M., Becoña, E., Bernardo, M., Caballero, L., Castells, X., Cunill, R., Florez, G., Franco, M. D., Garriga, M., Goikolea, J. M., González-Pinto, A., Landabaso, M., López, A., Martinez-Raga, J., Merino, A., Paramo, M., Rubio, G., Safont, G., Saiz, P. A., Solà, I., Tirado, J., Torrens, M., & Zorrilla, I. (2016). Clinical guideline for the treatment of dual pathology in the adult population. Adicciones, *28*(1), 3–5. https://doi.org/10.20882/adicciones.784

Sanchez-Roige, S., Fontanillas, P., Elson, S. L., Gray, J. C., de Wit, H., MacKillop, J., & Palmer, A. A. (2019). Genome-wide association studies of impulsive personality traits (BIS-11 and UPPSP) and drug experimentation in up to 22,861 adult research participants identify loci in the CACNA1I and CADM2 genes. *The Journal of Neuroscience*, *39*(13), 2662–2618. https://doi.org/10.1523/jneurosci.2662-18.2019

Schaeuffele, C., Schulz, A., Knaevelsrud, C., Renneberg, B., & Boettcher, J. (2021). CBT at the Crossroads: The Rise of Transdiagnostic Treatments. *International Journal of Cognitive Therapy*, *14*. https://doi.org/10.1007/s41811-020-00095-2

Schettler, L., Thomasius, R., & Paschke, K. (2022). Neural correlates of problematic gaming in adolescents: A systematic review of structural and functional magnetic resonance imaging studies. *Addiction Biology*, *27*(1), e13093. https://doi.org/10.1111/adb.13093

Shen, W., Liu, H., Xie, X., Liu, H., & Zhou, W. (2017). Biochemical Diagnosis in Substance and Non-substance Addiction. *Advances in Experimental Medicine and Biology*, *1010*, 169–202. https://doi.org/10.1007/978-981-10-5562-1_9

Shi, J., van der Maas, M., Yu, L., Jiang, Q., Agasee, S., & Turner, N. E. (2022). Current prevention strategies and future directions for problem Internet use. *Current Opinion in Behavioral*

Sciences, *48*, 101231. https://doi.org/10.1016/j.cobeha.2022.101231

Sinclair, D. L., & Sussman, S. (2025). Behavioral Addictions and Cardiovascular Health: A Scoping Review of the Peer-Reviewed Primary Research Literature. *Heart and Mind*. https://doi.org/10.4103/hm.hm-d-24-00080

Singer, J., Wöhr, A., & Steffen Otterbach. (2024). Gambling Operators' Use of Advertising Strategies on Social Media and Their Effects: A Systematic Review. *Current Addiction Reports*, *11*(3), 437–446. https://doi.org/10.1007/s40429-024-00560-4

Slutske, W. S. (2000). Common Genetic Vulnerability for Pathological Gambling and Alcohol Dependence in Men. *Archives of General Psychiatry*, *57*(7), 666–673. https://doi.org/10.1001/archpsyc.57.7.666

Smirni, D., Smirni, P., Lavanco, G., & Caci, B. (2023). Premorbid Personality Traits as Risk Factors for Behavioral Addictions: A Systematic Review of a Vulnerability Hypothesis. *Children*, *10*(3), 467. https://doi.org/10.3390/children10030467

Smith, A. C. (2025). Barriers to Medication-Assisted Treatment for Opioid Use Disorder in Prisons and Jails in the United States: A Comprehensive Literature Review. Retrieved June 25, 2025, from DigitalCommons@UNMC website: https://digitalcommons.unmc.edu/coph_slce/385

Squires, L. R., Hollett, K. B., Hesson, J., & Harris, N. (2021). Psychological Distress, Emotion Dysregulation, and Coping Behaviour: a Theoretical Perspective of Problematic Smartphone Use. *International Journal of Mental Health and Addiction*, *19*. https://doi.org/10.1007/s11469-020-00224-0

Stevens, H., Cooper , L., & Agroia , H. (2025). How Does Gambling Correlate with Chronic Health Conditions? *Missouri Medicine*, *122*(2), 144–149.

Stevens, M. W. R., Delfabbro, P. H., & King, D. L. (2021). Prevention approaches to problem gaming: A large-scale qualitative investigation. *Computers in Human Behavior*, *115*, 106611. https://doi.org/10.1016/j.chb.2020.106611

Suomi, A., Lucas, N., Dowling, N., & Delfabbro, P. (2022). Parental problem gambling and child wellbeing: Systematic review and synthesis of evidence. *Addictive Behaviors*, *126*, 107205. https://doi.org/10.1016/j.addbeh.2021.107205

Szerman, N., Martinez-Raga, J., Peris, L., Roncero, C., Basurte, I., Vega, P., … Casas, M. (2013). Rethinking Dual Disorders/Pathology. *Addictive Disorders & Their Treatment*, *12*(1), 1–10. https://doi.org/10.1097/adt.0b013e31826e7b6a

Szerman, N., Torrens, M., Maldonado, R., Balhara, Y. P. S., Salom, C., Maremmani, I., … Baler, R. (2022). Addictive and other mental disorders: a call for a standardized definition of dual disorders. *Translational Psychiatry*, *12*(1). https://doi.org/10.1038/s41398-022-02212-5

Tan, H. S., None Syidda, & Zhang, M. W. (2024). Mapping the landscape of telemedicine and technology in behavioral addiction treatment: A bibliometric review. *Proceedings of Singapore Healthcare*, *33*. https://doi.org/10.1177/20101058241289619

Tholl, C., Bickmann, P., Wechsler, K., Froböse, I., & Grieben, C. (2022). Musculoskeletal disorders in video gamers – a systematic review. *BMC Musculoskeletal Disorders*, *23*(1). https://doi.org/10.1186/s12891-022-05614-0

Tian, M. Y., Zhou, X. Y., Liao, X. Y., Gong, K., Cheng, X. T., Qin, C., … Lei, W. (2023). Brain structural alterations in internet gaming disorder: Focus on the mesocorticolimbic dopaminergic system. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *127*, 110806. https://doi.org/10.1016/j.pnpbp.2023.110806

Torales, J., Castaldelli-Maia, J. M., da Silva, A. G., Campos, M. W., González-Urbieta, I., & Barrios, I. (2019). Even More Complex…. When Mental Disorder Meets Addiction in Youth: Dual Pathology. *Current Drug Research Reviews*, *11*(1), 40–43. https://doi.org/10.2174/2589977511666181128165358

Tsumura, H., Fukuda, M., & Kanda, H. (2022). Blunted cortisol and normal sympathetic nervous system responses to an acute psychosocial stressor in Internet addiction. *Heliyon*, *8*(12), e12142. https://doi.org/10.1016/j.heliyon.2022.e12142

Varghese, R., Soman , N., & Kumar , D. (2023). Novel Advances and Recent Updates in The Crosstalk Between Neuroplasticity and Addiction. *Journal of Clinical Chemistry*, *1*(1). https://doi.org/10.31579/2835-8090/005

Vaughan, E., & Flack, M. (2022). Depression Symptoms, Problem Gambling and the Role of Escape and Excitement Gambling Outcome Expectancies. *Journal of Gambling Studies*, *38*(1), 265–278. https://doi.org/10.1007/s10899-021-10032-3

Velleman, R., Templeton, L., & Copello, A. (2005). The role of the family in preventing and intervening with substance use and misuse: a comprehensive review of family interventions, with a focus on young people. *Drug and Alcohol Review*, *24*(2), 93–109. https://doi.org/10.1080/09595230500167478

Vieira, C., Kuss, D. J., & Griffiths, M. D. (2023). Early maladaptive schemas and behavioural addictions: A systematic literature review. *Clinical Psychology Review*, *105*, 102340. https://doi.org/10.1016/j.cpr.2023.102340

Vitali, M., Sorbo, F., Mistretta, M., Scalese, B., Porrari, R., Galli, D., Coriale, G., Rotondo, C., Solombrino, S., Attilia, M. L., & Interdisciplinary Study Group CRARL - SITAC - SIPaD - SITD - SIPDip. (2018). Dual diagnosis: An intriguing and actual nosographic issue too long neglected. Rivista di Psichiatria, 53(3), 154–159. https://doi.org/10.1708/2925.29418

Walker, E. R., & Druss, B. G. (2018). Mental and Addictive Disorders and Medical Comorbidities. *Current Psychiatry Reports*, *20*(10), 1–10. https://doi.org/10.1007/s11920-018-0956-1

Wang, G., Dovile Simkute, & Griskova-Bulanova, I. (2023). Neurobiological Link between Stress and Gaming: A Scoping Review. *Journal of Clinical Medicine*, *12*(9), 3113–3113. https://doi.org/10.3390/jcm12093113

Wang, R., Minteer, S. D., Zhao, M., Yu, D., Hu, Y., Wiers, C. E., ... Yuan, K. (2019). Internet gaming disorder: deficits in functional and structural connectivity in the ventral tegmental area-Accumbens pathway. *Brain Imaging and Behavior*, *13*(4), 1172–1181. https://doi.org/10.1007/s11682-018-9929-6

Weiss, N. H., Darosh, A. G., Contractor, A. A., Schick, M. M., & Dixon-Gordon, K. L. (2019). Confirmatory validation of the factor structure and psychometric properties of the Difficulties in Emotion Regulation Scale-Positive. *Journal of Clinical Psychology*, *75*(7), 1267–1287. https://doi.org/10.1002/jclp.22768

Werling, A. M., & Grünblatt, E. (2022). A review of the genetic basis of problematic Internet use. *Current Opinion in Behavioral Sciences*, *46*, 101149. https://doi.org/10.1016/j.cobeha.2022.101149

Wolfers, L. N., & Schneider, F. M. (2021). Using Media for Coping: A Scoping Review. *Communication Research*, *48*(8), 1210-1234. https://doi.org/10.1177/0093650220939778

World Health Organization. (2015). Public health implications of excessive use of the internet, computers, smartphones and similar electronic devices: meeting report. https://iris.who.int/handle/10665/184264

World Health Organization. (2025). *International Classification of Diseases, Eleventh Revision (ICD-11)*. World Health Organization. https://icd.who.int/en

World Health Organization. (2024). *Clinical descriptions and diagnostic requirements for ICD-11 mental, behavioural and neurodevelopmental disorders*. World Health Organization. https://iris.who.int/handle/10665/375767

World Psychiatric Association (2019). Dual Disorders/Pathology. Retrieved June 24, 2025, from WPA website: https://www.wpanet.org/dual-disorders-pathology

Wu, J., & Zhang, H. (2025, April 1). An Introduction to the Development of the Anti-Addiction System of Online Games for Minors in China: — Based on Article 43 and 46 of the Regulations on Network Protection of Minors. https://doi.org/10.2991/978-2-38476-378-8_33

Wu, L., Potenza, M. N., Zhou, N., Kober, H., Shi, X., Yip, S. W., ... Zhang, J.-T. (2020). A role for the right dorsolateral prefrontal cortex in enhancing regulation of both craving and negative emotions in internet gaming disorder: A randomized trial. *European Neuropsychopharmacology*, *36*, 29–37. https://doi.org/10.1016/j.euroneuro.2020.04.003

Xian, H., Giddens, J. L., Scherrer, J. F., Eisen, S. A., & Potenza, M. N. (2014). Environmental factors selectively impact co-occurrence of problem/pathological gambling with specific drug-use disorders in male twins. *Addiction*, *109*(4), 635–644. https://doi.org/10.1111/add.12407

Xiang, Y.-T., Jin, Y., Zhang, L., Li, L., Ungvari, G. S., Ng, C. H., … Hao, W. (2020). An Overview of the Expert Consensus on the Prevention and Treatment of Gaming Disorder in China (2019 Edition). *Neuroscience Bulletin*, *36*(7), 825–828. https://doi.org/10.1007/s12264-020-00475-w

Xuan, Y.-H., Li, S., Tao, R., Chen, J., Rao, L.-L., Wang, X. T., & Zheng, R. (2017). Genetic and Environmental Influences on Gambling: A Meta-Analysis of Twin Studies. *Frontiers in Psychology*, *8*, Article 2121. https://doi.org/10.3389/fpsyg.2017.02121

Yan, W.-S., Zhang, R.-R., Lan, Y., Li, Y.-H., & Sui, N. (2016). Comparison of impulsivity in non-problem, at-risk and problem gamblers. *Scientific Reports*, *6*(1). https://doi.org/10.1038/srep39233

Yau, Y. H. C., Leeman, R. F., & Potenza, M. N. (2020). Biological Underpinning of Behavioral Addictions and Management Implications. *Textbook of Addiction Treatment*, 889–910. https://doi.org/10.1007/978-3-030-36391-8_63

Yip, S. W., & Potenza, M. N. (2014). Treatment of Gambling Disorders. *Current Treatment Options in Psychiatry*, *1*(2), 189–203. https://doi.org/10.1007/s40501-014-0014-5

Yu, Y., & Williams, D. R. (1999). Socioeconomic Status and Mental Health. *Handbooks of Sociology and Social Research*, 151–166. https://doi.org/10.1007/0-387-36223-1_8

Zack, M., St. George, R., & Clark, L. (2020). Dopaminergic signaling of uncertainty and the aetiology of gambling addiction. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *99*(1), 109853. https://doi.org/10.1016/j.pnpbp.2019.109853

Zeeck, A., Stelzer, N., Linster, H. W., Joos, A., & Hartmann, A. (2011). Emotion and eating in binge eating disorder and obesity. *European Eating Disorders Review*, *19*(5), n/a-n/a. https://doi.org/10.1002/erv.1066

Zhang, J.-T., Ma, S.-S., Yip, S. W., Wang, L.-J., Chen, C., Yan, C.-G., … Fang, X.-Y. (2015). Decreased functional connectivity between ventral tegmental area and nucleus accumbens in Internet gaming disorder: evidence from resting state functional magnetic resonance imaging. *Behavioral and Brain Functions*, *11*(1). https://doi.org/10.1186/s12993-015-0082-8

Zhou, X., Wu, R., Liu, C., Kou, J., Chen, Y., Pontes, H. M., … Montag, C. (2020). Higher levels of (Internet) Gaming Disorder symptoms according to the WHO and APA frameworks associate with lower striatal volume. *Journal of Behavioral Addictions*, *9*(3), 598–605. https://doi.org/10.1556/2006.2020.00066

Ziauddeen, H., & Fletcher, P. C. (2012). Is food addiction a valid and useful concept? Obesity Reviews, 14(1), 19–28. https://doi.org/10.1111/j.1467-789x.2012.01046.x

10

THE USE OF DIGITAL DEVICES IN CHILDHOOD AND ADOLESCENCE AND RELATIONAL PROBLEMS: BEYOND ADDICTION

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ABSTRACT:

In recent years, the problematic use of Information and Communication Relational Technologies (ICRT) has been a source of enormous social concern. The omnipresence of digital devices and the expansion of social media platforms have entailed a paradigm shift for relationships, for both adults and adolescents, transforming them into a critical context for the latter's biopsychosocial development. Despite the undeniable benefits and opportunities inherent to the ICRTs, they are not innocuous. On the one hand, their intensive use by adolescents is a risk factor in itself, which can be amplified by a lack of parental mediation on behalf of their families. In this sense, if we understand the use as a continuum, ranging from a healthy and adaptive use to a compulsive and potentially addictive use, it is necessary to associate the latter with the potential impacts it may have on other important areas of adolescents' lives. The emergence of ICRTs has shifted the paradigm of relationships among youth, wherefore online interactions can influence how they build relationships and the depth of their personal connections, with excessive use being both the cause and the solution to various problems. In this way, the use of technology becomes intertwined with other basic areas of adolescents' personal, academic, and family functioning. This chapter will review the relationships established in the scientific literature regarding addictive problems and technology use (e.g., problematic use of the Internet, social networks, Internet Gaming Disorder, or even pathological online gambling) with other relational spheres such as bullying, cyberbullying, sexting, online grooming, or parental mediation. Given the nature of these relationships and the high degree of overlap between these issues, clearly the use of technology must be addressed as a fundamental element in the adolescent socialization process. Therefore, prevention programs must be implemented holistically, taking into account the complexity of adolescence and always based on evidence.

KEYWORDS:

Problematic Internet use, Internet gaming disorder, cyberbullying, sexting, coexistence

1. FROM ICT TO ICRT: IMPORTANCE OF THE RELATIONAL FACTOR

There is no doubt, in recent decades information and communications technologies (ICTs) have transformed people's lives, offering countless opportunities and benefits in diverse areas such as education, work, healthcare, and entertainment. Its relevance in daily life is indisputable, especially among adolescents, who have grown up in an environment where access to digital devices and connection to the Internet are practically omnipresent. The use of ICTs facilitates access to a vast amount of information, fosters global communication, and provides platforms for learning and creativity. However, along with these benefits, the extensive and sometimes uncontrolled use of ICTs can entail significant risks, especially among youth. The problematic use of technologies, and more specifically the problematic use of social media or smartphones (Gámez-Guadix & Machimbarrena, 2025; Machimbarrena et al., 2023), has become a topic of growing concern among academics, educators and mental health professionals, as is shown in various chapters of this manual.

However, in this chapter we would like to highlight the relevance of the relational factor derived from the use of technologies. Not in vain, in recent years it has led to the expansion of the term ICT towards ICRT (Information and Communication Relational Technologies), thus incorporating the "R-elational Factor" (Gabelas et al., 2012). This R-elational factor implies a double dimension: the competence dimension, which refers to the ability to create and maintain social ties, and the risk dimension, associated with the abuse and/or misuse of technology (Marta-Lazo & Gabelas, 2017). It also integrates cognitive, emotional and social elements, essential to life skills, which allow a person to achieve a certain physical and emotional well-being (Marta-Lazo & Gabelas, 2017). Cognitive skills include critical thinking, perception of norms and limits, and self-assessment. Emotional skills encompass emotional control, stress management, and conflict resolution, while social skills include expression, communication, assertiveness, collaboration, and empathy. Given all of the above, it may be affirmed that the concept of ICRT goes beyond that of ICT.

Along these lines, technologies not only provide information and enable communication, but also facilitate relationships. Currently, we see how adolescents use technologies to interact, with three out of four minors registered on a social network before the age of 14 (Andrade et al., 2021). Moreover, Márquez et al. (2025) report in the Digital Childhood Survey that 92.5% of children and adolescents aged 10–20 are registered on at least one social media platform, and nearly 76% are registered on three or more. Marta-Lazo and Gabelas (2016) propose a space of symbiosis and synergy produced by the fusion of both online and offline environments. This is clearly in line with the co-construction theory proposed by Subrahmanyam and Smahel (2011), which describes the interconnection and bidirectionality between the adolescents' physical, social and digital worlds, configuring a new ecosystem crucial to their psychosocial development. Adolescents must develop skills that enable them to form and maintain meaningful relationships with others (Valkenburg & Peter, 2009). Although these skills were once unique to face-to-face communication, in the digital age they are increasingly built around the Internet, social media, or online video games. Therefore, to optimize the opportunities offered by ICRTs, it is essential to train new generations to manage their potential distortions and associated risks (González-Cabrera & Machimbarrena, 2023).

2. RELATIONAL AND DYSFUNCTIONAL RISKS: AN INTEGRATIVE PERSPECTIVE

Given the above, we must point out that our children, adolescents, and youth live today within a multifaceted reality. For pedagogical purposes, we divide the risks to which they are exposed on the Internet as dysfunctional (due to the inadequate use that people make of technology, leading them to present problems and psychosocial consequences in different aspects of their life) and relational (which emerge from the necessary interaction with third parties, sometimes peers, other times adults and who may be known or unknown that cause relevant problems; González-Cabrera & Machimbarrena, 2023). As regards dysfunctional risks, some examples are already included in the DSM-5-TR, such as gambling and Internet gaming disorder (IGD). These two problems, primarily, have a criterion of clinically significant distress or impairment in social, occupational, or other important areas of functioning. This issue is clearly reflected in the ICD-11: "The pattern of gaming behavior results in significant impairment to a person's functioning in personal, family, social, educational, occupational or other important areas" (World Health Organization, 2020).

On the other hand, relational risks on the Internet such as cyberbullying, online partner abuse, online grooming, etc. impact the lives of many people, also generating high levels of deterioration or personal distress, reducing their quality of life and psychological well-being (Ortega-Barón et al., 2023). Therefore, and highlighting the relational factor in this chapter, we will address some of the consequences that the excessive use of

technology can have on relational issues. In this sense, we can ask ourselves: How can we make visible this connection between technological problems of a more dysfunctional nature and those of a more relational nature? We can give two illustrative examples, among many. The idea is to convey to the reader that Internet-related problems and risks require a comprehensive approach, since children and adolescents are exposed to multiple realities. Sometimes these risks lead to behavioral addictions, though in many other cases they do not lead to such an outcome, but rather manifest consequences in different areas of life. The first example would refer to the antisocial behavior that occurs in video games: flaming. This is antisocial behavior linked to a specific ecosystem such as video games (and e-Sports). This form of toxic behavior is associated with online gaming communities, which often use offensive or aggressive language to express their intense feelings of anger, frustration, or disappointment in certain gaming situations. This triggers several negative factors that affect the experience, well-being, and performance, creating an unpleasant gaming environment for other players. These problems can even lead to bullying at school (in the offline, face-to-face context, when they are classmates, for example) or cyberbullying (Arisanty & Wiradharma, 2022). Therefore, an environment clearly linked to a behavioral problem such as video games, which can lead to a disorder, has a purely relational component that affects, intertwines with, and impacts the quality of life and emotional well-being of those involved.

The other visual example would be a current case in Spain with the law enforcement operation known as "Biscottu". An adult was arrested for cyber-deceiving two minors aged 8–9 with the intention of getting them to share explicit sexual content (coercive sexting) in exchange for virtual currencies to carry out microtransactions on a well-known video game platform (Onda Cero, 2024). This example also shows how an environment related to dysfunctional risks can become a scenario where potential relational risks of a sexualized nature occur (both sexting and online grooming). Furthermore, parental mediation (which will be discussed in subsequent pages) is key to avoiding these risks and protecting minors from some particularly sordid problems.

These two examples shed light on the complex interaction of risks, problems, and behavioral addictions that technologies can generate in our children and adolescents, mainly. Below, we will unpack some of these relational risks with the objective of presenting a different, broader, and unique perspective on this issue.

2.1 Bullying and cyberbullying

Peer victimization is a widely known and, unfortunately, common in our society, as it has been associated with physical, psychoemotional, and academic problems in adolescents (Moore et al., 2017), being one of the few educational problems that costs human lives (Cuesta et al., 2021) and a public health problem due to its prevalence (González-Cabrera, Montiel, et al., 2021). At the peak of this peer victimization is face-to-face school bullying. There is relative consensus on its definition, and is based on three key elements: power asymmetry, intentionality and repetition (Olweus, 2013). A

more literary definition of school bullying would be violent and intentional behavior that is repeated over time and implies an imbalance of power or strength between the aggressor(s) and the victim(s). However, the advent of technology has significantly expanded the dynamics of school bullying, extending its reach beyond the physical and temporal setting of schools.

Cyberbullying is a relational risk associated with Internet use in which, through ICRTs, one or more individuals impose violent behavior on their peers (Olweus, 2013). As with traditional bullying, cyberbullying is characterized by a marked power imbalance between the cybervictim and the cyberbully, repeated behaviors over time, and a clear intent to harm the other person. Due to its online nature and the omnipresence of social media, messaging apps, and other digital platforms, cyberbullying may proceed without interruption, even in the home. This paradigm shift means that victims can neither find refuge nor relief from the harassment, as it can occur anytime, anywhere, 24 hours a day, 7 days a week. Furthermore, digital technologies allow perpetrators to conceal their identity through the use of pseudonyms, which facilitates anonymity and can foster moral inhibition, diminishing the bullies' sense of responsibility for their actions. The ability to share harmful messages, compromising images or hurtful comments instantly with a wide audience, which can amplify the reach and emotional impact of cyberbullying, increasing the humiliation of victims and its bio-psycho-social consequences (Olweus, 2013). Additionally, content shared online can be difficult to eliminate completely, meaning evidence of cyberbullying can persist indefinitely, causing the victims long-term harm. In short, technology has made bullying more pervasive, anonymous, broader, and persistent, exacerbating its negative effects on those who experience it. Despite all that has been said, and the ubiquity of technologies, studies point to two relevant factors. First, cyberbullying is even less prevalent than traditional bullying (Pichel et al., 2022). Second, the clear overlap between both phenomena should be highlighted (Cosma et al., 2020).

Because cyberbullying is online in nature, it requires the use of technology and, therefore, can sometimes become problematic. Thus, several studies have highlighted this relationship between cyberbullying and various problematic uses of technology, such as Internet addiction, problematic Internet use (PIU), and IGD.

One of the most analyzed problems has been the general problematic use of the Internet, sometimes interpreted as addictive use of the Internet. One of the first studies to analyze this relationship was the longitudinal work of Gámez-Guadix et al. (2013). In this study conducted at two time points with 845 Spanish adolescents, cybervictimization at time 1 significantly predicted PIU at time 2. These results are especially relevant due to their longitudinal nature and could support the social compensation hypothesis (Valkenburg & Peter, 2009), according to which people tend to satisfy their social needs in the virtual world network when their social needs cannot be satisfied through face-to-face communication. In this way, to a certain extent, the Internet could act as a double-edged sword, being, on the one hand, the context for victimization, but, on the other, a means of escape from it. Along these lines, Andreassen (2015) hypothesizes

that people who find that social media can satisfy their needs could develop problematic use of social networks. In summary, teens may overuse the Internet or social media to compensate for social needs that go unmet offline. Consistent with these views, greater peer victimization significantly predicted higher incidences of problematic Internet, social media, or mobile phone use in several studies.

What seems clear is that these two problems are linked, and that both those who suffer from them are more likely to engage in problematic use, and those who engage in problematic use are more likely to be victims. Specifically, and in relation to the first affirmation, a study showed that cyber victims had an odds ratio (OR) of 4.1 more likely to report problematic use than uninvolved adolescents; while cyberbullies had an OR = 3.1 and cybervictim-aggressors an OR = 7.6 more likely to report it compared to uninvolved adolescents (Machimbarrena et al., 2021). As regards the second affirmation, another study found that presenting PIU is associated with being a victim of cyberbullying with an OR = 2.39, with being an aggressor with an OR = 3.68, and with being a cybervictim-aggressor with an OR = 3.26 (Feijóo et al., 2021).

In addition to the interest in the relationship between cyberbullying and PIU in general, it has also been analyzed in conjunction with specific problems such as IGD. Several cross-sectional studies have shown a positive association between cybervictimization and symptoms of IGD. For example, cybervictimization experiences could trigger the onset of problematic use of videogames and increase symptoms of gaming disorder (Gan et al., 2023). This would be in line with the social cognitive theory that explains how adolescents who suffer cybervictimization could resort to excessive or problematic gaming as a coping mechanism for the negative cognitions and emotions caused by cybervictimization (Bandura, 2001). However, there are also studies that postulate that IGD symptoms increase the risk of cybervictimization. Several mechanisms could hypothetically favor this increase. First, the online environment offers opportunities and anonymity, which makes it easier to access online video games and increases the likelihood of becoming a victim of cyberbullying. Second, IGD can lead to social isolation, causing adolescents to be highly dependent on online communities (Sublette & Mullan, 2012). This can be troubling, as there is also evidence that cybervictimization can occur in online gaming environments. Ballard and Welch (2017) found that of the 151 participants in a sample of massively multiplayer online game (MMOG) players, 52% reported frequently having been cybervictims and 35% having perpetrated cyberbullying within the MMOG itself. This underscores the interconnected nature of cybervictimization and IGD symptoms. Several studies have shown positive correlations between both problems. For example, a pioneering study with data collected in 2009 already contributed evidence that the perception of problems related to video games was associated with almost all aspects of poor social relationships, including problems in the case of school bullying (Rasmussen et al., 2015). Similarly, another study found that gamers classified as "potentially problematic" experienced and perpetrated more aggression both face-to-face and online against their peers (Šincek et al., 2017).

However, the direction of the relationship between cybervictimization and gaming disorder symptoms is complex, as suggested by the few longitudinal studies to date. In a two-time study, Neumayer et al. (2023) highlighted that traditional victimization and cybervictimization independently predicted changes in IGD at time two. Along the same lines, the study by Nie et al. (2024) found a strong relationship between cybervictimization and gaming disorder symptoms among individuals.

2.2 Sexting and online grooming

Sexting, a term derived from the combination of "sex" and "texting," refers to the sending, receiving, or sharing of sexually explicit content, often in the form of photographs, videos, or text messages, via electronic devices such as smartphones and computers. This phenomenon has gained relevance over the last decade, especially among adolescents, due to the increased use of digital technologies and social media.

Sexting can encompass a wide range of activities, from sending sexually explicit text messages to sharing nude or semi-nude photos or videos. According to Döring (2014), sexting can be classified into two main types: consensual sexting, where all parties involved agree to the exchange of material; and non-consensual sexting, where the content is shared without the permission of either party. The latter can lead to cyberbullying, extortion, or even unauthorized distribution of pornography. Wachs et al. (2021) also introduce the concept of coercive sexting to refer to the practice of creating or sending photos/videos with sexual content under coercion, that is, triggered by an underlying threat. Along these lines of sexualized risks, recent studies have begun to examine the relationship between electronic sexual victimization and pornography consumption. In a nationally representative Spanish sample of more than 4.000 adolescents, Águila-Otero and Pereda (2025) found that both experiencing and perpetrating electronic sexual violence were significantly more frequent among those who consumed pornography, particularly among girls. This finding reinforces the need to incorporate exposure to pornography into the framework of relational risks associated with intensive Internet use. The prevalence of sexting among adolescents varies depending on the studies and methodologies used. However, a meta-analysis conducted by Madigan, Ly, et al. (2018) suggests that approximately 14.8% of adolescents have sent sexts and 27.4% have received content of this nature.

The intersection between sexting and PIU manifests itself in various dimensions of adolescent behavior. The digital environment in which adolescents interact today facilitates not only communication and socialization, but also the development of risky behaviors. In fact, since adolescence represents a period of vulnerability, research affirms that teens are likely to engage in this type of risky behavior to show off and secure their social status. This could foster PIU, or problematic social media use and a higher prevalence of sexting among peers. It is also worth pointing out that sexting could be defined as a risk of self-exposure, since the person generates the content voluntarily (especially in consensual sexting), as part of a relationship between equals and, subsequently, this material can be used to harm them (González-Cabrera & Machimbarrena, 2022).

Several studies have identified a significant relationship between PIU and the propensity to engage in sexting. For example, Tamarit et al. (2021) found that the most significant predictor of sexting behaviors was Internet addiction. These results were replicated by Ragona et al. (2023) who found that social media addiction plays a role in determining sexting behaviors, motivation to do so, and reinforcing body image. Although several cross-sectional studies find similar results (Ruiz et al., 2021), the longitudinal study conducted by Gámez-Guadix and de Santisteban (2018) did not find a relationship between PIU at time one and sexting behaviors at time two. However, accumulating evidence suggests that excessive Internet use may be a risk factor for the development of these sexual behaviors.

In relation to coercive sexting, we must highlight the concomitant relationship with online grooming processes. These two risks/problems are part of a process of recruitment, seduction and manipulation in which the minor develops a feeling of attachment and intimacy with the adult that hides primarily sexual intentions (*child online grooming*). Sexual solicitation refers to online requests that minors receive from adults to send them sexually explicit photos or videos, answer sexually explicit questions, or engage in sexual activities online or offline. On the other hand, sexualized interaction is when a minor interacts online with an adult by sending sexually explicit photos or videos, engaging in sexual conversations, or meeting with the adult for sex. At the international level, the meta-analysis by Madigan, Villani, et al. (2018) points out that 11.5% of minors (12–16 years old) received sexual requests online. In the context of Spain, the UNICEF report, with a nationally representative sample, indicates that one in ten adolescents has received a sexual proposition from an adult on the Internet (Andrade et al., 2021). On the other hand, Santisteban and Gámez-Guadix (2018) indicate that 12.6% of minors reported sexual requests and 7.9% sexualized interactions with adults through the Internet. In turn, a longitudinal study indicates that the period prevalence, in this case the number of cases in the 13 months of study of sexual requests is 23% and of interactions 14% (Ortega-Barón et al., 2022). Another recent longitudinal study adds a key piece to this picture. Mateos-Pérez et al. (2025) found that online self-harm increased the likelihood of subsequently experiencing grooming, cybervictimization, and non-consensual sexting, and revealed reciprocal relationships among some of these risks. This work reinforces the hypothesis that online sexual and relational risks coexist and mutually reinforce one another, particularly within temporal trajectories of vulnerability.

Several studies have highlighted that Internet usage time is a risk factor, as it has been linked to a greater likelihood of experiencing online sexual advances (Whittle et al., 2013). In a study with 1,763 participants, Tamarit et al. (2021) found that Internet addiction was directly related to online grooming. Along the same lines, Machimbarrena et al. (2018) suggested a significant relationship between PIU and online grooming, especially in the case of girls. Additionally, recent literature has begun to identify psychological and behavioral predictors of grooming. In a study with Argentine adolescents, Resett et al. (2025) showed that sexting and cybervictimization directly predict grooming, while

emotional problems function both as consequences of these experiences and as factors that increase the risk of victimization. These results underscore the bidirectional and cumulative nature of these risks

Given the foregoing, it is worth clarifying that social media is not the only space where these phenomena can occur. Although the scientific literature on this subject is scarce, two cases linking online grooming to video game use were already discussed in the chapter's introduction. We must not forget that video games offer different communication possibilities where adults and children can interact in the same space. The evolution of communication tools on gaming platforms is an important part of the gaming experience (whether as a communication or planning tool or to enhance the player's gameplay experience). In this sense, Drejer et al., (2024) indicate that adults can use various verbal and non-verbal strategies (such as sending gifts) to establish contact, deceive and isolate victims. This isolation can occur through the game's private spaces, chats, servers, or hidden locations. For deception purposes, criminals may manipulate avatars to build trust and use in-game gifts to manipulate or coerce victims. Therefore, it is necessary for parents and educators to be aware of the forms of communication that exist in video games and their nature to be able to prevent these types of problems.

2.3 Problems at the family level

In contrast to traditional or offline parenting, the popularization of the Internet in homes has created a new context that takes place online, especially for the so-called Generation Z and those born in the early 2000s, and Generation Alpha, starting in 2010. As several authors have indicated, we cannot speak of two separate dimensions (or of real versus virtual worlds), but rather that both realities are interconnected and interrelated, and the online context has real effects when it comes to shaping people's subjectivity and identity. We can affirm that, in addition to traditional offline parenting, which is still present in young people's socialization, a new online layer has been added, with its own structure and entity, which we refer to as online parenting (Sevilla-Fernández, Machimbarrena, et al., 2025). Regarding the results of the scientific literature, in recent years it has been shown that the use of some online parental mediation strategy is usually a protective factor against problems derived from technology use (López-de-Ayala-López et al., 2022). Overall, numerous studies have found that parental mediation as a whole is considered one of the most effective methods for addressing the risks that adolescents face online. On the contrary, not using parental mediation strategies often increases the risks of PIU and video game abuse (Nielsen et al., 2019). However, what does not seem so clear are the specific effects that different types of parental mediation have in reducing certain risks and promoting responsible use of the Internet (Nielsen et al., 2019). In fact, recent literature indicates that parental mediation plays a fundamental role in reducing risks associated with social media use. In a recent systematic review analyzing 32 studies published over the past decade, Sevilla-Fernández, Díaz-López, et al. (2025) concluded that parental strategies —particularly restrictive ones, though

also tailored combinations depending on the specific risk— reduce both time spent online and adolescents' exposure to problems derived from intensive social media use. However, the authors also note that there is still no consensus regarding which mediation modality is most effective in each context, highlighting the complexity of the digital ecosystem during adolescence.

At the family level, PIU and IGD can generate significant friction and tension. Conflicts often arise when parents try to set limits and control the time their children spend online or playing video games. Discrepancies in perceptions about the appropriate use of technology can lead to frequent disagreements and arguments. Parents may perceive excessive technology use as a threat to their children's healthy development, while teens may view it as an integral part of their social lives and entertainment.

Furthermore, a lack of effective communication and mutual understanding between parents and children can exacerbate these conflicts. A study by Bonnaire and Phan (2017) found that family relationships and conflicts are associated with IGD in both sexes. These results have been confirmed by more recent studies where, for example, the presence of PIU is related to poorer family functioning, while also time spent on specific online activities (social networks, pornography, streaming media, etc.) is associated with poorer family functioning (Lochner et al., 2024). In studies measuring the influence of family-related variables, low family cohesion and high family conflict —including interparental conflict— were correlated with higher rates of PIU (Soh et al., 2018), whereas family cohesion may protect an adolescent from developing IGD (Bonnaire & Phan, 2017).

Despite this, it is worth noting that the lack of longitudinal studies has not yet allowed us to understand the causality of the relationship between family cohesion and rules and PIU. There are studies indicating that the severity of IGD was greater in adolescents who perceived their parents' attitude as neglectful (Geniş & Ayaz-Alkaya, 2023), while other studies state that stricter rules on Internet use were associated with lower quality of the parent-adolescent relationship (Peebles & Chen, 2024). Other studies highlight the bidirectionality of this association. For example, Zhou et al. (2023), arrived at the conclusion that family dysfunction directly predicts increased problematic gaming but that adolescents' problematic gaming also directly predicts increased feelings of family dysfunction. Finally, family relationships may not only be a criterion variable, but also act as a mediating or moderating factor on other variables. For example, in a recent study, Feng et al. (2023) found that high family support exacerbated the adverse effect of peer victimization on problematic social media use among adolescents through psychological insecurity. This is a complex dynamic, as shown in the qualitative study carried out by Rial and Fundación Barrié (2022), which reveals that parents are concerned about the unsupervised use of video games, which monopolizes adolescents' leisure time and leads them to abandon important activities in their daily lives. Alluding to the lack of parental control in general and the dubious example they set, minors point out that, in their opinion, monitoring is not advisable and that parental controls are not effective. At the same time, they indicate that we should build trust, improve communication, and set limits.

2.4 Multi-risk prevention programs: a global psychoeducational vaccine

Over the past two decades, especially in the last one, numerous prevalence studies, reviews, and meta-analyses have been conducted on all the Internet risks discussed (cyberbullying, sexting, online grooming, etc.) and technological addictions (IGD, online gambling, etc.). These are well-known problems and, to a greater or lesser extent, prevalent and worrying for children and adolescents. However, and following what is set out in this chapter, in recent years, research has begun on the relationship and overlap of certain cyber risks, such as cybervictimization among peers, sexting and online grooming and their impact (González-Cabrera, Machimbarrena, et al., 2021; Machimbarrena et al., 2018). Along these lines, Ortega-Barón et al. (2023) showed that 2.7% of adolescents (10–15 years old) simultaneously overlapped three types of online victimization (cybervictimization among peers, online abuse in the couple and sexualized solicitation and interaction with adults). As regards dysfunctional risks, there are advances that also address the overlap between PIU and IGD (Machimbarrena et al., 2023) or between both together with online gambling disorder (Díaz-López et al., 2024).

In the educational context, many initiatives have been carried out to address these problems, usually through programs aimed at preventing a single Internet problem or risk (see Ortega-Barón et al., 2021; Ortega-Barón et al., 2023 for more information). However, there have been very few programs that focus prevention on the combination of some risks, for example, Cyberprogram 2.0, Prev@cib or Brief Preventive Intervention prevent cyberbullying, sexting and/or online grooming (e.g., Cortazar et al., 2021; Ortega-Barón et al., 2019). However, these programs do not collectively address all Internet risks and not all focus on age ranges highly recommended for primary prevention work (11–13 years) (Yeager et al., 2015). In this sense, a broader vision is needed to address the greatest number of risks in the minimum number of sessions through the creation of an Internet-based pedagogical design that addresses the highest number of problems. Some of the experiences launched that have obtained effectiveness indicators have been the Safety.net program (Ortega-Barón et al., 2024) and the DOMINUS Program (Basterra-González, 2024).

In this case, we are going to focus on the Safety.net Program. It was created with a spirit of primary prevention aimed at jointly preventing up to eight Internet risks, both relational (cyberbullying, sexting, online grooming, cyber dating abuse) and dysfunctional (PIU, nomophobia, IGD and online gaming disorder) in adolescents aged 11–14 (especially aimed at students aged 12–13). Specifically, the program's main objective is to prevent the appearance and increase of these problems in adolescence; this was initially confirmed in its pilot (Ortega-Barón et al., 2021) and reconfirmed in the final study, along with indicators of indicated prevention through the reduction of some key problems (Ortega-Barón et al., 2024). Safety.net consists of 16 one-hour sessions divided into 4 modules: (1) digital competencies: the objective is to educate students about the characteristics of technologies that may entail risks and to provide them with skills to prevent digital victimization and dysfunctional Internet use; (2) relational risks:

this module aims to raise awareness of the seriousness of the risks arising from the students' Internet-based relationships with others and to offer them advice on these issues; (3) dysfunctional risks: the objective of this module is to raise awareness of the seriousness of the risks arising from dysfunctional Internet use and to contribute guidance on the safe use of ICTs; and (4) attitudinal and cognitive change: this module aims to promote certain skills, competencies and abilities in adolescents so that they can better cope with Internet risks.

Conceptually, this program is based on four theoretical frameworks (see Ortega-Barón et al., 2021; Ortega-Barón et al., 2024 for more information): the theory of planned behavior, the social co-construction model, the cumulative risk model, and empowerment theory. First, therefore, the theory of planned behavior assumes that intentions influence behavior, wherefore if we change the motivational factors related to intentions we can modify behavior. In this sense, throughout the Safety.net program, in addition to attempting to change negative behaviors in the online context, we also aim to change the motivations that influence the intentions behind the engagement in these inappropriate behaviors. Second, based on the co-construction model, the Safety.net program also conceives that certain parallels exist between what happens in the online and offline contexts of adolescents' lives. Third, the program adheres to the premises of the cumulative risk model, considering that adolescents are often exposed to several risks at the same time and that this simultaneous exposure to multiple risks has worse consequences for their development than exposure to a single risk. Finally, to provide teens with tools and resources they can use when faced with the various Internet-related risks, this program is also based on the theory of capacity-building and empowerment. This program serves as an example of comprehensive primary prevention by presenting a comprehensive approach that addresses clearly dysfunctional problems, including technologically-based behavioral addictions and other relational risks. The multifaceted and complex reality of our children, adolescents, and young adults' use of the Internet and technological devices requires a limitless vision that allows us to develop educational vaccines to potentially reduce their impact.

3. CONCLUSIONS

Throughout these pages, we have sought to capture the interconnected nature and degree of overlap among certain issues. This handbook clearly addresses behavioral addictions given their consequences on the lives of those who experience them as well as their families, as they lead to a deterioration in the psychological and social functioning of those who are affected. However, in this chapter we intended to emphasize that possible technological addictions (leaving to others the debate about the appropriateness, or not, of the term) and the use of technology have a series of ramifications and effects in other spheres of adolescents' lives: such as relationships and coexistence. It is important

that research and interventions not only focus on isolated risks, but also adopt a holistic vision, considering that an adolescent who engages in PIU may be more exposed to cyberbullying, or that an adolescent with IGD symptoms is also at greater risk of being a victim of online grooming. This, without forgetting that both cyberbullying and online grooming, as previously mentioned, are already occurring phenomena and are often overlapping, and, when this occurs, the impact on quality of life is even greater.

Technology offers countless advantages, and our goal is not to advocate for its prohibition, but it's also undeniable that technology is not harmless. Although potential behavioral addictions are one of the many problems our adolescents and young adults are exposed to, there are many other variables that technology use can impact. The lack of adequate regulation and limited public awareness exacerbate these problems, making a multidisciplinary and coordinated approach imperative. This is a future challenge for society as a whole. This chapter addresses family coexistence as a key element, highlighting the importance of parental mediation and the effect that technology can have on families as a unit. Primary prevention of these problems largely lies in the family and in the early stages. However, the family is not the only responsible party. Both educational authorities and governments are responsible for promoting a healthy use of technology, supported by research and evidence-based approaches. Schools represent a further mechanism for the primary and secondary prevention of these aforementioned issues through their counseling departments and tutoring activities. We believe that the Safety.net program, presented in this chapter is a potential response that presents a comprehensive and holistic approach to addressing a wide range of relational and dysfunctional risks. However, programs that address new risks (such as the use of artificial intelligence, problematic use of pornography, social media, or loot boxes) and that include training for families and educators will also be needed. Only through joint and sustained action among families, schools, and public authorities can the negative effects of technology use be mitigated and the benefits maximized for our present and future generations.

REFERENCES

Águila-Otero, A., & Pereda, N. (2025). Victimization and perpetration of online sexual violence among Spanish adolescents and its relationship with the consumption of pornography. *Journal for the Study of Education and Development: Infancia y Aprendizaje*, *48*(3), 575-600. https://doi.org/10.1177/02103702251341261

Andrade, B., Guadix, I., Rial, A., & Suárez, F. (2021). *Impacto de la tecnología en la adolescencia. Relaciones, riesgos y oportunidades*. UNICEF España. https://www.unicef.es/publicacion/impacto-de-la-tecnologia-en-la-adolescencia

Andreassen, C. S. (2015). Online Social Network Site Addiction: A Comprehensive Review. *Current Addiction Reports*, *2*(2), 175-184. https://doi.org/10.1007/s40429-015-0056-9

Arisanty, M., & Wiradharma, G. (2022). The motivation of flaming perpetrators as cyberbullying behavior in social media. *Jurnal Kajian Komunikasi*, *10*(2), 215. https://doi.org/10.24198/jkk.v10i2.39876

Ballard, M. E., & Welch, K. M. (2017). Virtual Warfare: Cyberbullying and Cyber-Victimization in MMOG Play. *Games and Culture*, *12*(5), 466-491. https://doi.org/10.1177/1555412015592473

Bandura, A. (2001). Social Cognitive Theory: An Agentic Perspective. *Annual Review of Psychology*, *52*(1), 1-26. https://doi.org/10.1146/annurev.psych.52.1.1

Basterra-González, A., Machimbarrena, J. M., Ortega-Barón, J., & González-Cabrera, J. (2026). Efficacy in autonomous Prevention of dysfunctional risks and responsible use of the internet in adolescents: DOMINUS program. *Revista de Psicodidáctica*. https://doi.org/10.1016/j.psicod.2025.500179

Bonnaire, C., & Phan, O. (2017). Relationships between parental attitudes, family functioning and Internet gaming disorder in adolescents attending school. *Psychiatry Research*, *255*, 104-110. https://doi.org/10.1016/j.psychres.2017.05.030

Cortazar, N., Calvete, E., Fernández-González, L., Echezarraga, A., Beranuy, M., León, A., González-Cabrera, J., & Orue, I. (2021). Effects of a Brief Preventive Intervention in cyberbullying and grooming in adolescents. *Psychosocial Intervention*, *30*(2), 75-84. https://doi.org/10.5093/pi2020a22

Cosma, A., Walsh, S. D., Chester, K. L., Callaghan, M., Molcho, M., Craig, W., & Pickett, W. (2020). Bullying victimization: Time trends and the overlap between traditional and cyberbullying across countries in Europe and North America. *International Journal of Public Health*, *65*(1), 75-85. https://doi.org/10.1007/s00038-019-01320-2

Cuesta, I., Montesó-Curto, P., Metzler Sawin, E., Jiménez-Herrera, M., Puig-Llobet, M., Seabra, P., & Toussaint, L. (2021). Risk factors for teen suicide and bullying: An international integrative review. *International Journal of Nursing Practice*, *27*(3), e12930. https://doi.org/10.1111/ijn.12930

de Santisteban, P., & Gámez-Guadix, M. (2018). Prevalence and Risk Factors Among Minors for Online Sexual Solicitations and Interactions With Adults. *The Journal of Sex Research*, *55*(7), 939-950. https://doi.org/10.1080/00224499.2017.1386763

Díaz-López, A., Caba-Machado, V., Machimbarrena, J. M., Ortega-Barón, J., Pérez-Rodríguez, P., & González-Cabrera, J. (2024). Dysfunctional risks of the internet and their overlap in the different stages of adolescence. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *18*(1). https://doi.org/10.5817/CP2024-1-7

Döring, N. (2014). Consensual sexting among adolescents: Risk prevention through abstinence education or safer sexting? *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *8*(1), Article 1. https://doi.org/10.5817/CP2014-1-9

Drejer, C., Sabet, S. S., Baugerud, G. A., & Riegler, M. A. (2024). *It's All in the Game—An Exploration of Extensive Communication on Gaming Platforms and the Risks of Online Sexual Grooming*. https://doi.org/10.2139/ssrn.4671140

Feijóo, S., Foody, M., O'Higgins Norman, J., Pichel, R., & Rial, A. (2021). Cyberbullies, the Cyberbullied, and Problematic Internet Use: Some Reasonable Similarities. *Psicothema*, *33.2*, 198-205. https://doi.org/10.7334/psicothema2020.209

Feng, J., Chen, J., Jia, L., & Liu, G. (2023). Peer victimization and adolescent problematic social media use: The mediating role of psychological insecurity and the moderating role of family support. *Addictive Behaviors*, *144*, 107721. https://doi.org/10.1016/j.addbeh.2023.107721

Gabelas, J. A., Marta-Lazo, C., & Aranda, D. (2012). Por qué las TRIC y no las TIC [Why RICT and not ICT]. *COMeIN*, *9*. https://doi.org/10.7238/c.n9.1221

Gámez-Guadix, M., & de Santisteban, P. (2018). "Sex Pics?": Longitudinal Predictors of Sexting Among Adolescents. *Journal of Adolescent Health*, *63*(5), 608-614. https://doi.org/10.1016/j.jadohealth.2018.05.032

Gámez-Guadix, M., & Machimbarrena, J. M. (2025). Internet risks and challenges among young adults and adolescents: An overview and research prospects. *Journal for the Study of Education and Development: Infancia y Aprendizaje*, *48*(3), 483-503. https://doi.org/10.1177/02103702251358182

Gámez-Guadix, M., Orue, I., Smith, P. K., & Calvete, E. (2013). Longitudinal and Reciprocal Relations of Cyberbullying With Depression, Substance Use, and Problematic Internet Use Among Adolescents. *Journal of Adolescent Health*, *53*(4), 446-452. https://doi.org/10.1016/j.jadohealth.2013.03.030

Gan, X., Qin, K.-N., Xiang, G.-X., & Jin, X. (2023). The relationship between parental neglect and cyberbullying perpetration among Chinese adolescent: The sequential role of cyberbullying victimization and internet gaming disorder. *Frontiers in Public Health*, *11*, 1128123. https://doi.org/10.3389/fpubh.2023.1128123

Geniş, Ç., & Ayaz-Alkaya, S. (2023). Digital game addiction, social anxiety, and parental attitudes in adolescents: A cross-sectional study. *Children and Youth Services Review*, *149*, 106931. https://doi.org/10.1016/j.childyouth.2023.106931

González-Cabrera, J., & Machimbarrena, J. M. (2023). Quality of Life and Its Relationship with Bullying and Cyberbullying. En C. Martin, V. R. Preedy, & V. B. Patel (Eds.), *Handbook of Anger, Aggression, and Violence* (pp. 1-18). Springer International Publishing. https://doi.org/10.1007/978-3-030-98711-4_171-1

González-Cabrera, J., Machimbarrena, J. M., Fernández-González, L., Prieto-Fidalgo, Á., Vergara-Moragues, E., & Calvete, E. (2021). Health-Related Quality of Life and Cumulative Psychosocial Risks in Adolescents. *Youth & Society*, *53*(4), 636-653. https://doi.org/10.1177/0044118X19879461

González-Cabrera, J., Montiel, I., Ortega-Barón, J., Calvete, E., Orue, I., & Machimbarrena, J. M. (2021). Epidemiology of Peer Victimization and its Impact on Health-Related Quality of Life in Adolescents: A Longitudinal Study. *School Mental Health*, *13*(2), 338-346. https://doi.org/10.1007/s12310-021-09421-1

Lochner, C., van den Berg, G., Chamberlain, S. R., Marincowitz, C., & Coetzee, B. (2024). Family functioning and problematic usage of the internet in youth: A cross-sectional investigation. *Journal of Psychiatric Research*, *173*, 239-244. https://doi.org/10.1016/j.jpsychires.2024.03.038

López-de-Ayala-López, M.-C., Catalina-García, B., & Pastor-Ruiz, Y. (2022). Problematic internet use: The preference for online social interaction and the motives for using the Internet as a mediating factor. *Communication & Society*, 1-17. https://doi.org/10.15581/003.35.2.1-17

Machimbarrena, J. M., Beranuy, M., Vergara-Moragues, E., Fernández-González, L., Calvete, E., & González-Cabrera, J. (2023). Problematic Internet use and Internet gaming disorder: Overlap and relationship with health-related quality of life in adolescents. *Adicciones*, *35*(2), 107. https://doi.org/10.20882/adicciones.1494

Machimbarrena, J. M., Calvete, E., Fernández-González, L., Álvarez-Bardón, A., Álvarez-Fernández, L., & González-Cabrera, J. (2018). Internet Risks: An Overview of Victimization in Cyberbullying, Cyber Dating Abuse,

Sexting, Online Grooming and Problematic Internet Use. *International Journal of Environmental Research and Public Health*, *15*(11), 2471. https://doi.org/10.3390/ijerph15112471

Machimbarrena, J. M., González-Cabrera, J., Montiel, I., & Ortega-Barón, J. (2021). An Exploratory Analysis of Different Problematic Internet Use Profiles in Cybervictims, Cyberbullies, and Cyberbully Victims. *Cyberpsychology, Behavior, and Social Networking*, *24*(10), 664-672. https://doi.org/10.1089/cyber.2020.0545

Madigan, S., Ly, A., Rash, C. L., Van Ouytsel, J., & Temple, J. R. (2018). Prevalence of Multiple Forms of Sexting Behavior Among Youth: A Systematic Review and Meta-analysis. *JAMA Pediatrics*, *172*(4), 327. https://doi.org/10.1001/jamapediatrics.2017.5314

Madigan, S., Villani, V., Azzopardi, C., Laut, D., Smith, T., Temple, J. R., Browne, D., & Dimitropoulos, G. (2018). The Prevalence of Unwanted Online Sexual Exposure and Solicitation Among Youth: A Meta-Analysis. *Journal of Adolescent Health*, *63*(2), 133-141. https://doi.org/10.1016/j.jadohealth.2018.03.012

Márquez, J. M., Andrade, B., Guadix, I., Suarez, F., Rodríguez, F. J., González, & Rial, A. (2025). *Adolescencia y bienestar digital: Una aproximación desde la salud, la convivencia y la responsabilidad social*. Observatorio Nacional de Tecnología y Sociedad. https://doi.org/10.30923/IABD202510

Marta-Lazo, C., & Gabelas, A. (2017). *Comunicación digital: Un modelo basado en el Factor R-elacional*. Editorial UOC.

Mateos-Pérez, E., Martínez-Bacaicoa, J., Wachs, S., & Gámez-Guadix, M. (2025). Longitudinal associations of online self-harm with online victimization through cyberbullying, hate speech, online grooming and nonconsensual sexting. *Journal for the Study of Education and Development: Infancia y Aprendizaje*, *48*(3), 663-687. https://doi.org/10.1177/02103702251352943

Moore, S. E., Norman, R. E., Suetani, S., Thomas, H. J., Sly, P. D., & Scott, J. G. (2017). Consequences of bullying victimization in childhood and adolescence: A systematic review and meta-analysis. *World Journal of Psychiatry*, *7*(1), 60. https://doi.org/10.5498/wjp.v7.i1.60

Neumayer, F., Jantzer, V., Lerch, S., Resch, F., & Kaess, M. (2023). Traditional Bullying and Cyberbullying Victimization Independently Predict Changes in Problematic Internet Gaming in a Longitudinal Sample. *Journal of Adolescent Health*, *73*(2), 288-295. https://doi.org/10.1016/j.jadohealth.2023.03.013

Nie, Q., Griffiths, M. D., & Teng, Z. (2024). The Role of Self-Esteem in Protecting Against Cyber-Victimization and Gaming Disorder Symptoms Among Adolescents: A Temporal Dynamics Analysis. *Journal of Youth and Adolescence*, *53*(4), 863-876. https://doi.org/10.1007/s10964-023-01890-8

Nielsen, P., Favez, N., Liddle, H., & Rigter, H. (2019). Linking parental mediation practices to adolescents' problematic online screen use: A systematic literature review. *Journal of Behavioral Addictions*, *8*(4), 649-663. https://doi.org/10.1556/2006.8.2019.61

Olweus, D. (2013). School Bullying: Development and Some Important Challenges. *Annual Review of Clinical Psychology*, *9*(1), 751-780. https://doi.org/10.1146/annurev-clinpsy-050212-185516

OndaCero. (2024, junio 7). Detenido por embaucar a menores residentes en La Rioja para obtener material pornográfico a cambio de dinero virtual. *OndaCero*. https://www.ondacero.es/emisoras/rioja/rioja/noticias/detenido-ciberdepredador-22-anos-embaucar-ninas-obtener-pornografia-tio-peligroso_20240607666 2dbb6fc83ee0001dae995.html

Ortega-Barón, J., Buelga, S., Ayllón, E., Martínez-Ferrer, B., & Cava, M.-J. (2019). Effects of intervention program Prev@cib on traditional bullying and cyberbullying. *International Journal of Environmental Research and Public Health*, *16*(4), 527. https://doi.org/10.3390/ijerph16040527

Ortega-Barón, J., González-Cabrera, J., Machimbarrena, J. M., & Montiel, I. (2021). Safety.Net: A Pilot Study on a Multi-Risk Internet Prevention Program. *International Journal of Environmental Research and Public Health*, *18*(8), 4249. https://doi.org/10.3390/ijerph18084249

Ortega-Barón, J., Machimbarrena, J. M., Caba-Machado, V., Díaz-López, A., Tejero-Claver, B., & González-Cabrera, J. (2023). Solicitation and Sexualized Interactions of Minors with Adults: Prevalence, Overlap with Other Forms of Cybervictimization, and Relationship with Quality of Life. *Psychosocial Intervention*, *32*(3), 155-163. https://doi.org/10.5093/pi2023a15

Ortega-Barón, J., Machimbarrena, J. M., Calvete, E., Orue, I., Pereda, N., & González-Cabrera, J. (2022). Epidemiology of online sexual solicitation and interaction of minors with adults: A longitudinal study. *Child Abuse & Neglect*. https://doi.org/10.1016/j.chiabu.2022.105759

Ortega-Barón, J., Machimbarrena, J. M., Díaz-López, A., Caba-Machado, V., Tejero, B., & González-Cabrera, J. (2024). Eficacia de un programa de prevención multirriesgo en internet: Safety.net. *Revista de Psicodidáctica*, *29*(2), 97-106. https://doi.org/10.1016/j.psicod.2024.01.004

Peebles, A., & Chen, Y. A. (2024). Parental Internet practices in the family system: Restrictive mediation, problematic Internet use, and adolescents' age-related variations in perceptions of parent-child relationship quality. *Journal of Social and Personal Relationships*, *41*(6), 1347-1369. https://doi.org/10.1177/02654075231221581

Pichel, R., Feijóo, S., Isorna, M., Varela, J., & Rial, A. (2022). Analysis of the relationship between school bullying, cyberbullying, and substance use. *Children and Youth Services Review*, *134*, 106369. https://doi.org/10.1016/j.childyouth.2022.106369

Ragona, A., Mesce, M., Cimino, S., & Cerniglia, L. (2023). Motivations, Behaviors and Expectancies of Sexting: The Role of Defensive Strategies and Social Media Addiction in a Sample of Adolescents. *International Journal of Environmental Research and Public Health*, *20*(3), Article 3. https://doi.org/10.3390/ijerph20031805

Rasmussen, M., Meilstrup, C. R., Bendtsen, P., Pedersen, T. P., Nielsen, L., Madsen, K. R., & Holstein, B. E. (2015). Perceived problems with computer gaming and Internet use are associated with poorer social relations in adolescence. *International Journal of Public Health*, *60*(2), 179-188. https://doi.org/10.1007/s00038-014-0633-z

Resett, S., Gonzalez Caino, P., & Mesurado, B. (2025). Prediction of online grooming in adolescents based on emotional problems, sexting, cybervictimization and sex and age differences. *Journal for the Study of Education and Development: Infancia y Aprendizaje*, *48*(3), 721-750. https://doi.org/10.1177/02103702251355453

Rial, A. & Fundación Barrie. (2022). *Adolescencia, Tecnología, Salud y Convivencia*. https://fundacionbarrie.org/publicaciones-detalle?818

Ruiz, M. J., Sáez, G., Villanueva-Moya, L., & Expósito, F. (2021). Adolescent sexting: The role of body shame, social physique anxiety, and social networking site addiction. *Cyberpsychology, Behavior, and Social Networking*, *24*(12), 799-805. Scopus. https://doi.org/10.1089/cyber.2020.0719

Sevilla-Fernández, D., Díaz-López, A., Caba-Machado, V., Machimbarrena, J. M., Ortega-Barón, J., & González-Cabrera, J. (2025). Parental mediation and the use of social networks: A systematic review. *PLOS ONE*, *20*(2), e0312011. https://doi.org/10.1371/journal.pone.0312011

Sevilla-Fernández, D., Machimbarrena, J. M., Díaz-López, A., Moreno-Ruiz, D., Rial-Boubeta, A., & González-Cabrera, J. (2025). Psychometric properties of the integrated and paired version of the EU-Global Kids Online questionnaire on parental mediation for Spanish children/families. *Journal for the Study of Education and Development: Infancia y Aprendizaje*, *48*(3), 688-720. https://doi.org/10.1177/02103702251342754

Šincek, D., Humer, J. T., & Duvnjak, I. (2017). Correlates of problematic gaming—Is there support for proneness to risky behaviour? *Psychiatria Danubina*, *29*(3), 302-312. https://doi.org/10.24869/psyd.2017.302

Soh, P. C.-H., Chew, K. W., Koay, K. Y., & Ang, P. H. (2018). Parents vs peers' influence on teenagers' Internet addiction and risky online activities. *Telematics and Informat-*

ics, *35*(1), 225-236. https://doi.org/10.1016/j.tele.2017.11.003

Sublette, V. A., & Mullan, B. (2012). Consequences of play: A systematic review of the effects of online gaming. *International Journal of Mental Health and Addiction*, *10*(1), 3-23. https://doi.org/10.1007/s11469-010-9304-3

Subrahmanyam, K., & Smahel, D. (2011). *Digital Youth*. Springer New York. https://doi.org/10.1007/978-1-4419-6278-2

Tamarit, A., Schoeps, K., Peris-Hernández, M., & Montoya-Castilla, I. (2021). The Impact of Adolescent Internet Addiction on Sexual Online Victimization: The Mediating Effects of Sexting and Body Self-Esteem. *International Journal of Environmental Research and Public Health*, *18*(8), Article 8. https://doi.org/10.3390/ijerph18084226

Valkenburg, P. M., & Peter, J. (2009). Social Consequences of the Internet for Adolescents: A Decade of Research. *Current Directions in Psychological Science*, *18*(1), 1-5. https://doi.org/10.1111/j.1467-8721.2009.01595.x

Wachs, S., Wright, M. F., Gámez-Guadix, M., & Döring, N. (2021). How Are Consensual, Non-Consensual, and Pressured Sexting Linked to Depression and Self-Harm? The Moderating Effects of Demographic Variables. *International Journal of Environmental Research and Public Health*, *18*(5), 2597. https://doi.org/10.3390/ijerph18052597

Whittle, H., Hamilton-Giachritsis, C., Beech, A., & Collings, G. (2013). A review of young people's vulnerabilities to online grooming. *Aggression and Violent Behavior*, *18*(1), 135-146. https://doi.org/10.1016/j.avb.2012.11.008

World Health Organization. (2020). *The International Classification of Diseases (ICD-11)* (11th ed.). World Health Organization. https://icd.who.int/

Yeager, D. S., Fong, C. J., Lee, H. Y., & Espelage, D. L. (2015). Declines in efficacy of anti-bullying programs among older adolescents: Theory and a three-level meta-analysis. *Journal of Applied Developmental Psychology*, *37*, 36-51. https://doi.org/10.1016/j.appdev.2014.11.005

Zhou, J., Zhao, H., Wang, L., & Zhu, D. (2023). The vicious cycle of family dysfunction and problematic gaming and the mediating role of self-concept clarity among early adolescents: A within-person analysis using random intercept cross-lagged panel modeling. *Journal of Behavioral Addictions*, *12*(4), 920-937. https://doi.org/10.1556/2006.2023.00054

11

NON-SUBSTANCE ADDICTIONS FROM A GENDER PERSPECTIVE

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ABSTRACT:

Addictions represent a complex issue involving a variety of elements and agents that contribute to both their onset and progression. One proposed explanatory framework is the so-called multidimensional model (Becoña, 2016), which posits that addictions are influenced by individual processes, social structures, and value systems, all of which interact in distinct ways over time, resulting in unique and specific manifestations in each individual.

One of the fundamental aspects in the analysis of addictions is the consideration of gender, a variable that has not been extensively studied in the context of behavioral addictions. In the case of women experiencing addictive disorders, numerous stereotypes persist concerning drug use, often associating it with prostitution or with a perceived abandonment of their socially assigned caregiving and maternal roles. These stereotypes obscure the "real" issues faced by women with addictions and constitute a major barrier to accessing treatment. This is largely due to the design of addiction treatment programs and interventions, which are frequently developed from an androcentric perspective. For instance, intervention manuals tend to reflect patterns and factors predominantly associated with male consumption, given that male consumption remains the cultural and statistical norm (Meneses, 2002).

Current research in the field of addictions demonstrates that women with substance use disorders differ from their male counterparts in terms of addiction patterns, psychosocial and physiological characteristics, practices, meanings, motivations, and the consequences associated with substance use (Estévez et al., 2023). Evidence also indicates that risk factors and triggers for relapse differ between men and women, and that women display distinct emotional and behavioral responses during and after such episodes (Zakiniaeiz & Potenza, 2018). Despite these differences, the gender-specific analysis of addiction has only been systematically undertaken over the past three decades (Campbell et al., 2025). In this context, adopting a gender perspective becomes an essential analytical tool, as androcentric approaches still prevail in the study, protocol design, treatment planning, and service delivery in the field of addictions.

This chapter aims to examine specific aspects of behavioral addictions from a gender perspective, analyzing actions and behaviors that deviate from the normative gender roles traditionally assigned to women.

KEYWORDS:

behavioral addictions, women, gender perspective, gambling disorder

1. INTRODUCTION

Addictions have been described from an androcentric perspective as traditionally male leisure practices. As a consequence, treatments and prevention have been mainly designed for men. The scientific literature agrees that men have a higher propensity to develop addictive behaviours (McHugh et al., 2018), with higher levels of sensation-seeking, impulsivity and risk-taking than women (Estévez, Aonso-Diego, Fernández-García, & Macía, 2025). In addition, social pressures for substance use and involvement in addictive behaviours appear to be higher among men, especially young men. However, to date, the vast majority of empirical evidence has focused on binary sex differences, it is to say, between men and women, or, at most, on disaggregating data by sex. Sex refers to biological characteristics, whereas gender includes gender identity and expression; that is, it focuses on the roles, behaviours, expectations, and social and cultural norms associated with being male or female (Aonso-Diego et al., 2026).

However, women also suffer from addictions, in addition to aspects such as negative social stigma. The guilt and shame suffered by women aggravate the problem and favour the appearance of comorbid mental or psychosomatic disorders (Aonso-Diego et al., 2025). Although addictive behaviour may present similar manifestations in practice, the vulnerability factors and psychosocial consequences associated with addiction may be very different depending on sex and gender. At the end of 2010, a growing interest in integrating the gender perspective in the field of addictions was observed, and there is an increasing need to promote its study to develop more adapted and effective prevention and treatment strategies. This is why research and analysis from a gender perspective is essential.

Studies such as the one by Prever et al. (2023) have shown that women's profiles may differ in terms of pattern of use, onset, psychosocial and physiological characteristics, evolution, practice, meanings and motivations and comorbidity, as well as in the consequences of addictive behaviours. Previously, Bowden-Jones and Prever (2017)

analysed this from a cross-cultural perspective of female gamblers, finding differences according to country and using gender as a differentiating factor (Macía et al., 2025). In addition, women who display addictive behaviour show parallels with women who do not display addictive behaviour, suggesting that differences between men and women may be due to negative experiences related to gendered distress, such as work and economic conditions, traumatic events, sexual abuse in childhood, conflicts about partners and family, highlighting gender violence and the importance of care, among many others (Estévez et al., 2023). As a result of gender socialisation, a series of roles and social expectations are assigned to each of the sexes, and women suffering from behavioural addictions may present different characteristics and needs than men.

In this chapter, some of the most common behavioural addictions are explored in more depth using gender as an analysis category. The addictions described below are gambling disorder, video game addiction, and compulsive shopping. Gambling disorder is a mental health problem and was the first behavioural addiction to be recognised by the 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association [APA], 2013). Video game addiction is also included in the World Health Organisation (WHO) classification manual, the *International Classification of Diseases* (ICD-11; WHO, 2019). In the case of compulsive shopping, although it is not classified as an addiction, it is a potentially addictive behaviour that has been associated with women. However, it is also necessary to include a more in-depth analysis to determine its classification within the diagnostic category of non-substance-related addictions.

2. GAMBLING DISORDER

Estimates of prevalence of gambling disorder vary considerably between countries and jurisdictions, influenced by the screening measures used and a variety of methodological factors. Studies such as the one by Estévez et al. (2023) have shown the need to adapt assessment criteria from a gender perspective that considers the severity, motivations, idiosyncratic characteristics, etc., of female gamblers. According to the 2023 *Report on behavioural addictions and other addictive disorders* (Observatorio Español de las Drogas y las Adicciones [OEDA- Spanish Observatory of Drugs and Addictions]), it is estimated that, in 2022, approximately 1.7% of the Spanish population aged 15-64 could have a potential gambling problem. This number is higher among men (2.4%) than women (0.9%). Potential problem gambling is more common among online gamblers than among those who gamble in a presence-based modality, a consistent tendency that affects both sexes (OEDA, 2023). In this context, 52.09% of problem gamblers are male, and 47.91% are female. Although women have always had gambling problems, the existing literature shows that more women suffer from gambling problems than are present in therapeutic centres (Lamas et al., 2018). When studying the access routes to gambling activity, it is found that most gamblers are men, both in presence-based modalities and

online, predominantly using online platforms, where they make up 75.44% (Dirección General de Ordenación del Juego [DGOJ- General Management of Gambling Regulations], 2023). In Spain, concerning online gambling, according to the survey *Surveys on Alcohol and Other Drugs in Spain* (OEDA, 2022: EDADES), 5.3% of the population aged 15-64 years gambled online in 2022. Online gambling was significantly more common among men (8.0%) than among women (2.5%), with a higher frequency among young adults, decreasing with age. The type of online gambling par excellence for men is sports betting (53.9%), while among women, games such as lottery (58.7%) stand out. Concerning gambling disorder, as measured by the Problem Gambling Severity Index (PGSI), a reduction in both low-risk gambling and moderate/severe-risk gambling was observed in 2022. In females, the low-risk and moderate/severe-risk profiles decreased to 2.4% and 0.5%, respectively, in 2022. However, as women age, problem gambling increases, and prevalences begin to catch up with those of men (Molinaro & Baroni, 2024).

There is some consensus on the onset of gambling disorder. The scientific community confirms that the disorder usually starts in adolescence for men and at an older age for women, following different trajectories but with a tendency to become a chronic problem (Macia & Estevez, 2022). Male players are under 35 years; in contrast, female players are between 35 and 64 years (Bonnaire et al., 2017). Therefore, regarding the progression of problem gambling, women start to gamble later, with a difference of up to 14 years in the age of onset between men and women (Lamas et al., 2018), but the progression of the problem is faster in the case of women (Echeburúa et al., 2011). The development of the addictive process can take up to 10 to 11 years in men, whereas in women, this process is completed in approximately 4 years (Vázquez, 2012). Therefore, when contacting rehabilitation resources, although men and women report similar durations of problem gambling, women have been gambling for less time than men, as female gamblers would need less time from the onset of gambling until it becomes problematic, and they seek treatment (Kim et al., 2016). The rapid progression of problem gambling observed in women is referred to as the 'telescoping effect', with women reporting greater severity of problem gambling over a shorter period of time (Grant et al., 2012). However, research indicates that the data between males and females are beginning to converge among youth and adolescents, with females starting to gamble at a much younger age than before, and the age of onset for males and females may even out (Macía, Jauregui & Estévez, 2022). Differences in the rates of addictive behaviours have been related to a greater extent to gender/cultural environment than to biological factors (Fonseca et al., 2021). Thus, as these behaviours become more feminised and normalised among the female population, we observe an increasing prevalence and an earlier age of onset, as highlighted in gambling disorder and the abuse of video games, tobacco or alcohol, among others (Estévez & Macía, 2024).

When studying the typology of gambling, it is observed that women and men are not inclined towards the same forms of gaming or gambling addiction. Men tend to opt for games that enable competition or socialisation and interaction with peers, as

is the case in sports betting shops and casinos. In contrast, women prefer to remain unnoticed and anonymous (Rius et al., 2021) and play in safer and less intimidating environments (McCormack et al., 2014). In addition, women seem to have a greater tendency towards non-strategic and chance-based games (Estévez et al., 2023). In this sense, women prevail among gamblers who only play lottery games, accounting for 52.88%. On the other hand, men predominate among gamblers who also participate in other gambling activities, accounting for 73.63% (DGOJ, 2023). Furthermore, 2.6% of men spend more than 20 hours a week gambling online (Dios & Pérez, 2021). However, some studies suggest that the severity of gambling in women lies in their use of gambling as a mechanism to relieve or avoid negative emotions and not so much in their gambling frequency (Estévez et al., 2024). Women often choose to play slot machines, which have a high addictive potential and lead to problematic use more quickly (Petry, 2003), as well as being a type of gambling that has been associated with the loss of the notion of time.

On the other hand, gambling and betting are not seen as traditionally female practices. Therefore, developing an addiction related to these behaviours implies breaking gender norms. This leads to social censure and a double stigma for women, as they are not only disregarding their female gender role but are also dealing with an addiction. In this sense, women are likely to choose socially accepted gambling activities, such as bingo, to avoid the stigma associated with other types of gambling (Echeburúa et al., 2011). Thus, the bingo environment is considered more suitable for women than other gambling options, as it offers a comfortable social situation (Granero et al., 2009). In contrast, men tend to engage in games requiring more competitiveness, strategy and action, such as sports betting, poker or racing, and they participate in multiple games simultaneously (Macia & Estévez, 2022). Women are more likely to engage in less strategic and more chance-based games (Molinaro & Baroni, 2024), such as bingo (Dios & Pérez, 2021), slot machines (Husky et al., 2015), lottery (OEDA, 2022), or scratch cards. A possible explanation is that, following a gender analysis, women are brought up as emotional providers, prioritising their feelings and interpersonal relationships, often at the expense of their own desires, which are postponed, inhibited or unknown. This socialisation generates a clear dichotomy, valuing the masculine in contrast to the normalisation of the feminine, which reinforces passivity, submission, dependence and the assumption of inferior roles (Behar, 2018). This could partly explain why women tend to choose more luck-based gambling games than games that require skills (Dios & Pérez, 2021). Linked to this, men show greater impulsivity, a higher interest in financial gain, sensation-seeking (Wong et al., 2013) and suffer from greater peer pressure (Echeburúa et al., 2011). In contrast, women use gambling to relieve negative emotional states or escape from their problems, dissatisfaction and frustrations (Molinaro & Baroni, 2024). Therefore, specific motivations that drive women to problem gambling include loneliness, boredom, low self-esteem, stress and depression, as well as the need to escape from personal or family problems (Vázquez, 2012).

In this regard, it is suggested that, before developing an addiction, women report a greater number of psychosocial problems, such as unemployment, interpersonal problems, family history of alcohol and drug abuse or gambling, traumatic childhood events, and experiences of significant loss and domestic violence (Estévez & Macía, 2024). Of the women who suffer from gambling addiction, 70% are victims of abuse (Rius et al., 2021). These problems are often accompanied by psychological disorders (e.g., anxiety, depression and self-harming behaviours), sometimes prior to the addiction (Marcos & Chóliz, 2019), which may lead women to use gambling as a form of escape. Although stress and anxiety are facilitators of addiction, they also often turn out to be consequences of addiction. Thus, in terms of comorbidity, as can be seen from the motivations outlined above, women suffer more comorbid problems than men and have a greater history of mental health-related problems. Women report depressive or anxiety disorders and lower self-esteem, whereas men report higher alcohol and other substance abuse and criminal behaviour (Håkansson & Widinghoff, 2020). These results could be related to higher premorbid depressive personality in females and higher antisocial traits in males (Echeburúa et al., 2011). Although women are at significant risk of suffering problems related to addictive substances (Macía, Jauregui & Estévez, 2023), men also tend to present depression or anxiety, which is detected later due to some men's difficulty of introspection or higher scores in alexithymia (Macía et al., 2023). Moreover, as mentioned, men are more likely to engage in criminal behaviour, such as theft or substance trafficking, and this, together with the request for credit or microcredits, facilitates rapid indebtedness, which in turn favours the detection of the problem, even more so in a young population.

Concerning criminal behaviour, men are more likely to report gambling-related arrests, whereas women report illegal activities related to gambling but no arrests (Potenza et al., 2001). Both men and women report high levels of gambling-related indebtedness, but this is more likely in women, who also have higher levels, which may be related to greater difficulty in recognising the addiction (Håkansson & Widinghoff, 2020). There is no consensus on this point, as other studies indicate that gambling behaviour correlates with the level of indebtedness, so the logical consequence would be that men get into debt more frequently and quickly (Ruis et al., 2021). However, this could be explained by the fact that, as reported by the treatment centres, women who seek help when they arrive have a higher level of severity.

At the same time, the greater social stigma in women with gambling problems directly impacts their greater difficulty in recognising the problem and greater feelings of guilt and shame. Consequently, there is added resistance to seeking the corresponding psychotherapeutic and socio-healthcare help, as well as less family support in the rehabilitation process (Lamas et al., 2018). In addition, problem gambling in women has been linked to an increased risk of intimate partner violence (Hing et al., 2022).

3. VIDEO GAMES

In the *Report on behavioural addictions and other addictive disorders* for the year 2023 (OEDA), it is observed that in Spain, 83.1% of secondary school students aged between 14 and 18 report having played video games in the last 12 months. This activity continues to be considerably more frequent among boys than among girls, maintaining a similar trend to previous years, such as 2019 and 2021. Concerning adults, 96.2% of men report having played video games, compared to 69.7% of women. As for the frequency of video game use in 2023, it is highlighted that the most common practice is weekly gaming (29.8%). Furthermore, men are observed to be more likely to suffer from video game use disorder, with 7.7% of men affected compared to 2.5% of women (DGOJ, 2023). However, video game use decreases with age. Approximately 50% of students who played video games in 2021 played at least once a week. Similarly, most students who played video games in the last 12 months played less than 2 hours daily, according to a scale based on DSM-5-TR criteria (APA, 2022). However, although there is a gender gap, and men are more regular consumers, video game use is no longer an activity exclusively carried out by men (McLean & Griffiths, 2019). Women may also comprise the population at risk of developing dysfunctional video game use (Cervigón-Carrasco, García Montoliu et al., 2022).

Throughout the literature, many studies agree that men are more likely to become addicted to video games (López-Fernández et al., 2021). One of the reasons for this is that for men, exposure to video games, regardless of their content, is more enjoyable (Cervigón-Carrasco, García Montoliu et al., 2022) and acts as a reinforcing experience (Stevens et al., 2021). Another reason for the higher prevalence in men is the time spent playing video games, as men are more likely to play for a longer time than women (Ricoy & Ameneiros, 2016). From a gender perspective, one reason is that women have less time available to play (Estévez, Macia, Gandarias et al., 2023). However, as age increases, women are more likely to reach a dysfunctional video game consumption pattern that closely resembles men's (López-Fernández, 2018).

Another significant gender difference found in the literature that affects the predisposition to develop an addiction to video games is related to game preferences. Being male could be linked to specific gaming preferences (López-Fernández et al., 2021), which require more time and are more demanding, explaining the time spent playing video games (Rehbein et al., 2016). As previously discussed concerning gambling, women tend to opt for strategy, mental skills or social simulation video games, which are less addictive, as they generate a lower level of excitement. In contrast, men prefer online multiplayer role-playing video games, which are usually action-based, competitive (e.g., fighting or sports) and often involve violence (López-Fernández et al., 2021). These are open environment video games that provide consumers with recreating fictional experiences, freely allowing them to express themselves violently through the use of 'weapons' (Ricoy & Ameneiros, 2016). Role-playing games and games involving shooting

are the two typologies that most significantly explain men's greater involvement in video games (Estévez et al., 2025).

In turn, the choice of different video game typologies and, consequently, the level of involvement leading to addiction could be influenced by gender roles. These traits could explain why men prefer competitive and violent video games, whereas women prefer more intellectual video games (López-Fernández et al., 2021). These traits could also explain why men are more inveterate players than women and are inclined towards video games that require more time and dedication and involve them in more dysfunctional patterns of video game use (López-Fernández et al., 2021). This is because certain games require more time and energy to improve performance within the video game, which poses a higher risk of addiction (Lopez-Fernandez, 2018). Although this phenomenon has also been found in women (Lopez-Fernandez, Williams & Kuss, 2019), the literature tends to consider women more as casual gamers (McLean & Griffiths, 2019).

In women, in addition, being introverted and having poor social skills (García-Oliva & Piqueras, 2016) could constitute risk factors, as their gaming preferences imply loneliness. In contrast, competitive and aggressive motivations prevail in men despite their negative consequences (Vollmer et al., 2014). Other preliminary studies also show that low levels of positive affectivity may be associated with problematic video game use. Unpleasant experiences may make women prone to developing a dysfunctional pattern of video game use as a regulatory mechanism to cope with the moods generated by such experiences (Evren et al., 2019). In addition, the absence or scarcity of positive affect could increase negative emotional experiences because the two poles of affect are autonomous but complementary, implying a possible risk factor for women (Cervigón-Carrasco, García-Barba et al., 2022). This aligns with other studies that find that depression commonly affects women more than men and may predict problematic video game use (Wang et al., 2018). Thus, video game use could be a coping strategy that women use to deal with certain depressive symptoms, even if they are not fully aware of them (Lopez-Fernandez, Williams & Kuss, 2019). Comorbid problems that might also be somewhat predictive of video game addiction for both genders include hostility (Stavropoulos et al., 2017) and social phobia (Sioni et al., 2017), both of which might explain why addicted women tend to exhibit high levels of irritability and avoid social contact (Lopez-Fernandez et al., 2019).

On the other hand, playing violent video games is related to aggressive and criminal behaviour, producing a more hostile worldview in men than in women (Anderson & Dill, 2000). Violent externalising behaviours are also found in some women who report playing video games (Desai et al., 2010). Female characters in video games are often absent or hypersexualised, and violence against them is common (Dietz, 1998). Although there are now more female characters, they are still objectified and subjected to violence. Along these lines, in a recent qualitative study by Estévez, Macía, Gandarias et al. (2023), which aimed to analyse the experiences of female video game players, they observed that women players showed a greater tendency to use English (as a neutral

language compared to Spanish), to use male names to introduce themselves and to mute their voices or express themselves in writing, to avoid aggressive, violent or sexist comments, as well as to be taken more seriously as players.

Different patterns of video game use have been observed between men and women. Men play more frequently and spend more time playing, they spend more money, and play more on consoles and computers. Women play more on mobiles and tablets than men. Men play more action, sports and simulation games, whereas women play educational, leisure and social interaction games (Gómez-Gonzalvo et al., 2020).

4. COMPULSIVE BUYING

The systematic review of the literature has shown an estimated prevalence rate of compulsive shopping in general adult populations was 4.9% (3.4 – 6.9%). Prevalence rates were higher in samples of university students at 8.3% (5.9 – 11.5%) and, as expected, the highest prevalence rates were observed in specific samples of shoppers at 16.2% (8.8 – 27.8%). Most surveys found that prevalence rates were higher among women (Maraz et al., 2016). Compulsive shopping has an approximate prevalence in Spain of 4% of those admitted to treatment: 35.2% are men and 64.8% are women (OEDA, 2023).

The analysis of compulsive buying behaviour presents significant discrepancies between different studies throughout the literature (Nicoli de Mattos et al., 2016). On the one hand, several studies suggest that compulsive shopping is equally prevalent among men and women, as they show similar rates (Müeller et al., 2010). Other studies report no differences in the severity of compulsive shopping, but they highlight significant qualitative differences in the manifestation of the addictive behaviour (Nicoli de Mattos et al., 2016). On the other hand, much of the scientific literature reports that women show a greater addiction to purchases (Maraz et al., 2016) aimed at improving their personal image, such as clothing, accessories, footwear, cosmetics, make-up, perfumes and jewellery, regardless of their economic earnings or social position (Uzarska et al., 2021). In contrast, men tend to buy electronics, cars, watches and suits. In this regard, it has been suggested that the prevalences might be similar and that the difference between women and men might lie in the objects they purchase (Rodríguez et al., 2016).

These differences can be explained by social expectations and issues related to gender roles socially assigned to each sex (Charzyńska et al., 2021). One of the reasons for such discordances in the literature could be the scarcity of men in the samples of studies analysing compulsive shopping (Nicoli de Mattos et al., 2016), contrary to samples in studies on addictions such as gambling disorder or video games.

In this regard, compulsive shopping occurs more frequently in women (Behar, 2018) and the average age of onset is between 18 and 30. Despite this, women take an average of 10 years to seek treatment (Díez et al., 2018). It has been established that women have the habit of shopping as a method of emotional regulation so that their purchases are

focused on acquiring items for physical and emotional well-being (Marcet et al., 2016). In the case of men, studies show that the male gender purchases primarily entertainment and leisure products. However, in recent years, there has been a perceived increase in men's purchases of fashion and beauty items (Muñoz et al., 2019). In this sense, men's purchases seek to satisfy the need to feel independent and capable and also ratify the installed idea of what is considered masculine (Nicoli de Mattos et al., 2016).

Another reason why compulsive buying seems to be more pronounced among women could be that women have a higher psychological motivation to buy, as well as a higher social acceptance of shopping behaviour than men because the emotional and identity-related dimensions of shopping have greater meaning for women (Dittmar et al., 2004). Thus, for women, shopping takes on a more emotional, psychological and symbolic role than for men (Dittmar & Drury, 2000). Women tend to have generally positive attitudes towards the activity of shopping and the social interaction that it may entail. Thus, they relate it to a leisure activity, perceiving it as a form of entertainment. On the other hand, men generally adopt negative attitudes, as they tend to perceive shopping as a task they want to complete with as little time and effort as possible, associating it with a more work-related scenario (Campbell, 2000). Another reason could be that men's propensity for impulse buying may be influenced by the cultural perception that excessive shopping is more acceptable for women (Nicoli de Mattos et al., 2016). This could lead men to underestimate or fail to recognise their own compulsive behaviours, and women to more easily recognise their dysfunctional shopping pattern and thus demand treatment.

Concerning such cultural perceptions, the process of gender role socialisation supports more passive and emotional ways of handling stress and conflict among women, as they are characterised by an inclination to solve problems without excessive display and in socially accepted ways. Shopping is one of the ways not only accepted in the consumer society but even desirable as a source of social prestige.

Women are more impulsive when shopping as a means of self-fulfilment (Cardoso & Cascão, 2009), so they shop to escape and pass the time, giving importance to interpersonal interactions and emotional connections. Another motive is derived from identity construction. The items purchased are associated with the shoppers' self-concept, symbolising their identity (Dittmar et al., 2004). Therefore, female mothers and homemakers buy more for their children, household items, and/or food.

Another difference is that men may spend more money than women, even though they purchase fewer items, due to their type of shopping (Dios & Pérez, 2021). This could be because, as previously noted, women have fewer economic resources than men (Estévez et al., 2023). If it is accepted that the female gender identity is linked to shopping, it is plausible that women are more prone to compulsive shopping. However, these differences should not be interpreted as men's and women's inherent characteristics. Shopping behaviour will continue to be influenced by gender as long as cultural norms continue to associate shopping with female identity and women continue to have

fewer opportunities than men for other forms of psychological compensation due to their predominant role in the household and childcare (Dittmar, 2005). Society favours male stereotypes of independence and leadership, while imposing stereotypes of dependence and passivity on women. This situation could contribute to a less favourable self-concept development in women compared to men during adulthood, which reinforces gender inequalities (Schaab, 2014).

5. CONCLUSIONS

As can be seen, a gender perspective is necessary to understand the differential role of socialisation and clinical manifestations of men and women with behavioural addictions. In addition, we cannot refer to "women" in general without considering that there might be differences, for example, between young and adult women, depending on race, economic status, or many other characteristics.

On the other hand, recent studies such as that by Estévez et al. (2023) point out that, in women with addictions, variables related to gender distress, such as violence and traumatic situations during childhood and adolescence, should be taken into account. Undoubtedly, social expectations about caring for others, especially as mothers and daughters, are higher in women than in men. The feeling of being a "bad mother" or a "bad daughter" achieves a higher level, regardless of whether or not they have an addiction. Recent studies have shown that motherhood could function as both a protective and a risk factor throughout the course of addiction and subsequent treatment. In addition, the burden of caring for the home, raising children, and caring for dependents or elderly people could be an obstacle to accessing and maintaining the rehabilitation process (Estévez et al., 2025). Some of the most common feelings are guilt and shame, especially for not "fulfilling the expectations that society sets on them". In this sense, a strategy they might use could be to go out of their environment to other neighbourhoods to avoid being seen when they gamble. Traumatic experiences and gender-based distress also generate negative emotions, usually expressed in anxious and depressive symptoms. In the case of female gamblers, women with video game and shopping problems, these negative emotions are generally prior to the problem. The most serious exponent is suicidal ideation and behaviour (Santolaria et al., 2024). Consequently, gambling, video game or shopping problems could also be considered a means of coping with this emotional distress. However, we should not forget social factors such as the influence of partners in the initiation of activities such as gambling or the role played by socioeconomic status or work overload in the initiation and maintenance of addictions in women.

Another of the fundamental aspects that should be considered in women with behavioural addictions is that they receive less social support in treatment. The high masculinisation of treatment centres does not help and could cause feelings of rejection,

misunderstanding or shame (Hing et al., 2016). As a recommendation, authors such as Prever, Blycker and Brandt (2023) have shown the importance of women undergoing treatment in specific women's groups to be able to talk freely about their feelings and receive support from peers who are also going through the same experiences within addictions.

It is also important to note that the stigma women face could affect the delay and prevent their recognition of the problem and delay help-seeking (Mestre-Bach et al., 2022). Finally, it should be noted that gender does not only affect women with behavioural addictions. Men may also have specific obstacles to rehabilitation due to some attitudes associated with masculinity, for example, the difficulty of introspective reflection or the inability to recognise their responsibility or to receive control from a female support figure (Rius et al., 2021).

In conclusion, current research shows increasing evidence that points to the need to incorporate the gender dimension to understand the manifestation of addictive behaviours in women and men, as well as to assess and intervene in these behaviours. However, despite these efforts, a stronger body of research analysing such gender differences in behavioural addictions is still needed. Similarly, there is still a lack of gender-sensitive assessment and diagnostic tools, which, to date, mainly target men's addictions.

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-V),* fifth edition. Authors. Washington, DC. https://doi.org/10.1176/appi.books.9780890425657

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders (DSM-V-TR),* 5th edition revised. Authors Washington, DC. https://doi.org/10.1176/appi.books.9780890425787

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology, 78*(4), 772–790. https://doi.org/10.1037//0022-3514.78.4.772

Aonso-Diego, G., Etxaburu, N., Martínez-Cabrero, C., Liendo, M., & Estévez, A. (2025). The role of stigma in gambling disorder: A systematic review. Stigma and Health. Advance online publication. https://dx.doi.org/ 10.1037/sah0000672

Aonso-Diego, G., Iruarrizaga, I., Olave, L., Macía, L., Muñiz, J. A., Estévez, A. (2026). Behavioral addictions and compulsive behaviors based on sexual orientation: the role of gender. Psychology & Sexuality, 17(1), 83-100. https://doi.org/10.1080/19419899.2025.2540343

Becoña, E. (2016). La adicción "no" es na enfermedad cerebral. Papeles del Psicólogo, 37(2), 118-125.

Behar, R. (2018). La mujer moderna y el comprar compulsivo [The modern woman and compulsive shopping]. *Revista Chilena de Neuro-Psiquiatría, 56*(1), 46-56. http://dx.doi.org/10.4067/s0717-92272018000100046

Bonnaire, C., Barrault, S., Aïte, A., Cassotti, M., Moutier, S., & Varescon, I. (2017). Relationship between pathological gambling, alexithymia, and gambling type. *The American Journal on Addictions, 26*(2), 152–160. https://doi.org/10.1111/ajad.12506

Bowden-Jones, H., & Prever, F. (Eds.). (2017). *Gambling disorders in women: An International female perspective on treatment and research* (1st ed.). Routledge. https://doi.org/10.4324/9781315627625

Campbell, A. N. C., Burlew, A. K., Guille, C., Haidamus, M. A., Hien, D. A., Killeen, T, Lofwall, M. R., Paschen-Wolff, M. M., Patten. C. A., Sugarman, D. E., Winhusen, T. J., Bakhireva L. N., Loree, A. M., Mazel, S., Greenfield, S. F. (2025). Gender-specific addiction research needed now more than ever: Reflections from 25 years of the NIDA Clinical Trials Network Gender Special Interest Group. J Subst Use Addict Treat. 27:209849. doi: 10.1016/j.josat.2025.209849. Epub ahead of print. PMID: 41314548; PMCID: PMC12853563.

Campbell, C. (2000). Shopaholics, spendaholics, and the question of gender. In A. L. Benson (Ed.), *I shop, therefore I am: Compulsive buying and the search for self* (pp. 57-75). Jason Aronson.

Cardoso, A. A., & Cascão, F. (2009). O Enraizamento da Tendência de Compra Impulsiva Versus Planeada na Personalidade do Consumidor [The Rootedness of the Impulsive Versus Planned Buying Tendency in Consumer Personality]. *Portuguese Journal of Marketing/ Revista Portuguesa de Marketing,* (24).

Cervigón-Carrasco, V., García-Barba, M., Bisquert-Bover, M., & Giménez-García, C. (2022). Consumo problemático de videojuegos y afectividad: ¿Existen diferencias de género? [Problematic consumption of video games and affectivity: Are there gender differences?] *Publicacions de la Universitat Jaume I. Servei de Comunicació i Publicacions; Facultat de Ciències de la Salut. Universitat Jaume I, 8*. http://dx.doi.org/10.6035/AgoraSalut.2022.8.5

Cervigón-Carrasco, V., García Montoliu, C., Ballester-Arnal, R., Giménez-García, C., & Castro Calvo, J. (2022). Uso de videojuegos y estimación del tiempo: ¿existen diferencias en función del género? [Use of video games and time estimation: Are there gender differences?] *Revista INFAD de Psicología. International Journal of Developmental and*

Educational Psychology., 1(1), 399-406. https://doi.org/10.17060/ijodaep.2022.n1.v1.2396

Charzyńska, E., Sussman, S., & Atroszko, P. A. (2021). Profiles of potential behavioral addictions' severity and their associations with gender, personality, and well-being: A person-centered approach. *Addictive Behaviors, 119*, 106941. https://doi.org/10.1016/j.addbeh.2021.106941

Desai, R. A., Krishnan-Sarin, S., Cavallo, D., & Potenza, M. N. (2010). Video-gaming among high school students: Health correlates, gender differences, and problematic gaming. *Pediatrics, 126*(6), e1414–e1424. https://doi.org/10.1542/peds.2009-2706

Dietz, T. L. (1998). An examination of violence and gender role portrayals in video games: Implications for gender socialisation and aggressive behaviour. *Sex Roles: A Journal of Research, 38*(5-6), 425–442. https://doi.org/10.1023/A:1018709905920

Díez, D., Aragay, N., Soms, M., Prat, G., Bonet, P., & Casas, M. (2018). Women with compulsive buying or gambling disorder: Similar profiles for different behavioural addictions. *Comprehensive Psychiatry, 87*, 95–99. https://doi.org/10.1016/j.comppsych.2018.09.002

Dios, M., & Pérez, E. (2021). *Consumo digital: Imaginario colectivo y socialización de género.* [Digital consumption: Collective imaginary and gender socialization. Congress communication]. IX Congreso Internacional Multidisciplinar de Investigación Educativa, Barcelona, España. Retrieved from: https://amieedu.org/wp-content/uploads/2021/06/Programa_CIMIE2021.pdf

Dirección General de Ordenación del Juego (DGOJ). (2023). *Estudio de prevalencia de juego 2022-2023* [Gambling prevalence study 2022-2023]. Ministerio de Sanidad. Secretaría General de Consumo y Juego.

Dittmar H. (2005). Compulsive buying—a growing concern? An examination of gender, age, and endorsement of materialistic values as predictors. *British Journal of Psychology, 96*(4), 467-491. https://doi.org/10.1348/000712605X53533

Dittmar, H., & Drury, J. (2000) Self-Imagine—Is it in the bag? A qualitative comparison between "ordinary" and "excessive" consumers. *Journal of Economic Psychology, 21*, 109-142. https://doi.org/10.1016/S0167-4870(99)00039-2

Dittmar, H., Long, K., & Meek, R. (2004). Buying on the Internet: Gender differences in online and conventional buying motivations. *Sex Roles 50*, 423–444. https://doi.org/10.1023/B:SERS.0000018896.35251.c7

Echeburúa, E., González-Ortega, I., de Corral, P., & Polo-López, R. (2011). Clinical gender differences among adult pathological gamblers seeking treatment. *Journal of Gambling Studies, 27*(2), 215–227. https://doi.org/10.1007/s10899-010-9205-1

Echeburúa, E., Salaberría, K., & Cruz-Sáez, M. (2014). Nuevos retos en el tratamiento del juego patológico. *Terapia Psicológica, 32*(1), 31-40. https://dx.doi.org/10.4067/S0718-48082014000100003

Estévez, A., Aonso-Diego, G., Fernández-García, L., & Macía, L. (2025). Problematic gaming among adolescents and youth: The role of alexithymia, emotion regulation, and attachment based on sex. *Clinical and Health, 36*(1), 47-55. https://doi.org/10.5093/clh2025a6

Estévez, A., Gandarias, I., López-Berzosa, M., Fernández-Villardón, A., & Macía, L. (2025). Exploring the intersection between motherhood and caregiving in women with gambling disorder. *Revista Mujer y Políticas Públicas*

Estévez, A., Jauregui, P., Momeñe, J., & Macía, L. (2024). Association between gambling motives, violence and early maladaptive schemas in women with gambling disorder. *Journal of Gambling Studies*. Advance online publication. https://doi.org/10.1007/s10899-024-10285-8

Estévez, A. y Macía, L. (2024). Perspectiva de género en el trastorno de juego de azar. *Revista Española de Drogodependencias, 49*(4), 44-61. https://doi.org/10.54108/10096

Estévez, A., Macia, L., Gandarias, I., López, M., Jauregui, P., & Momeñe, J. (2023). Evaluación desde la perspectiva de género en adicciones con sustancias y comportamentales [Evaluation from the gender perspective of substance

and behavioral addictions]. *Instituto Vasco de la Mujer-Emakunde*.

Estévez, A., Macía, L., Ontalvilla, A., & Aurrekoetxea, M. (2023). Exploring the psychosocial characteristics of women with gambling disorder through a qualitative study. *Frontiers in Psychology, 14*, 1294149. https://doi.org/10.3389/fpsyg.2023.1294149

Evren, C., Evren, B., Dalbudak, E., Topcu, M., & Kutlu, N. (2019). Relationships of Internet addiction and Internet gaming disorder symptom severities with probable attention deficit/hyperactivity disorder, aggression and negative affect among university students. *Attention Deficit and Hyperactivity Disorders, 11*(4), 413–421. https://doi.org/10.1007/s12402-019-00305-8

Fonseca, F., Robles-Martínez, M., Tirado-Muñoz, J., Alías-Ferri, M., Mestre-Pintó, J. I., Coratu, A. M., & Torrens, M. (2021). A gender perspective of addictive disorders. *Current Addiction Reports, 8*(1), 89–99. https://doi.org/10.1007/s40429-021-00357-9

García-Oliva, C., & Piqueras, J. A. (2016). Experiential avoidance and technological addictions in adolescents. *Journal of Behavioral Addictions, 5*(2), 293–303. https://doi.org/10.1556/2006.5.2016.041

Gartner, C., Bickl, A., Härtl, S., Loy, J. K., & Häffner, L. (2022). Differences in problem and pathological gambling: A narrative review considering sex and gender. *Journal of Behavioral Addictions, 11*(2), 267–289. https://doi.org/10.1556/2006.2022.00019

Gómez-Gonzalvo, F., Devís-Devís, J., & Molina-Alventosa, P. (2020). Video game usage time in adolescents' academic performance. *Comunicar, 28*(65), 89-99. https://doi.org/10.3916/C65-2020-08

Granero, R., Penelo, E., Martínez-Giménez, R., Alvarez-Moya, E., Gómez-Peña, M., Aymamí, M. N., Bueno, B., Fernández-Aranda, F., & Jiménez-Murcia, S. (2009). Sex differences among treatment-seeking adult pathologic gamblers. *Comprehensive Psychiatry, 50*(2), 173–180. https://doi.org/10.1016/j.comppsych.2008.07.005

Grant, J. E., Odlaug, B. L., & Mooney, M. E. (2012). Telescoping phenomenon in pathological gambling: Association with gender and comorbidities. *The Journal of Nervous and Mental Disease, 200*(11), 996–998. https://doi.org/10.1097/NMD.0b013e3182718a4d

Håkansson, A., & Widinghoff, C. (2020). Gender differences in problem gamblers in an online gambling setting. *Psychology Research and Behavior Management, 13*, 681–691. https://doi.org/10.2147/PRBM.S248540

Harris, C. R., Jenkins, M., & Glaser, D. (2006). Gender differences in risk assessment: Why do women take fewer risks than men? *Judgment and Decision Making, 1*(1), 48–63. https://doi.org/10.1017/S1930297500000346

Hing, N., Russell, A. M. T., Black, A., Rockloff, M., Browne, M., Rawat, V., Greer, N., Stevens, M., Dowling, N. A., Merkouris, S., King, D. L., Salonen, A. H., Breen, H., & Woo, L. (2022). Gambling prevalence and gambling problems amongst land-based-only, online-only and mixed-mode gamblers in Australia: A national study. *Computers in Human Behavior, 132*, 1-10. https://doi.org/10.1016/j.chb.2022.107269

Hing, N., Russell, A., Tolchard, B., & Nower, L. (2016). Risk factors for gambling problems: An analysis by gender. *Journal of Gambling Studies, 32*(2), 511–534. https://doi.org/10.1007/s10899-015-9548-8

Husky, M. M., Michel, G., Richard, J. B., Guignard, R., & Beck, F. (2015). Gender differences in the associations of gambling activities and suicidal behaviors with problem gambling in a nationally representative French sample. *Addictive Behaviors, 45*, 45–50. https://doi.org/10.1016/j.addbeh.2015.01.011

Kim, H. S., Hodgins, D. C., Bellringer, M., & Abbott, M. (2016). Gender differences among helpline callers: Prospective study of gambling and psychosocial outcomes. *Journal of Gambling Studies, 32*(2), 605-623. https://doi.org/10.1007/s10899-015-9572-8

Lamas, J. J., Santolaria, R., Estévez, A., & Jáuregui, P. (2018). *Guía clínica específica: Mujer y juego*. Federación Española de Jugadores de Azar (FEJAR). Delegación del Plan Nacional Sobre Drogas.

Lopez-Fernandez O. (2018). Generalised versus specific Internet use-related addiction prob-

lems: A mixed methods study on Internet, gaming, and social networking behaviors. *International Journal of Environmental Research and Public Health, 15*(12), 2913. https://doi.org/10.3390/ijerph15122913

López-Fernández, F. J., Mezquita, L., Griffiths, M. D., Ortet, G., & Ibáñez, M. I. (2021). The role of personality on disordered gaming and game genre preferences in adolescence: Gender differences and person-environment transactions. El papel de la personalidad en el juego problemático y en las preferencias de géneros de videojuegos en adolescentes. *Adicciones, 33*(3), 263–272. https://doi.org/10.20882/adicciones.1370

Lopez-Fernandez, O., Williams, A. J., Griffiths, M. D., & Kuss, D. J. (2019). Female gaming, gaming addiction, and the role of women within gaming culture: A narrative literature review. *Frontiers in Psychiatry, 10*, 454. https://doi.org/10.3389/fpsyt.2019.00454

Lopez-Fernandez, O., Williams, A. J., & Kuss, D. J. (2019). Measuring female gaming: Gamer profile, predictors, prevalence, and characteristics from psychological and gender perspectives. *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.00898

Macia, L., & Estévez, A. (2022). La ludopatía no es solo cosa de hombres [Gambling addiction is not only a man's thing]. *The Conversation*. Retrieved from: https://theconversation.com/la-ludopatia-no-es-solo-cosa-de-hombres-187098

Macía, L., Aonso-Diego, G., Prever, F., Minci, M., & Estévez, A. (2025). Predictors of Gambling Severity Among Female Gamblers: Cross-Country Study with Spanish and Italian Clinical Population. *Journal of gambling studies*, *41*(3), 1175–1187. https://doi.org/10.1007/s10899-024-10369-5

Macía, L., Estévez, A., & Jáuregui, P. (2022). Gambling: Exploring the role of gambling motives, attachment and addictive behaviours among adolescents and young women. *Journal of Gambling Studies, 39*(1), 183–201. https://doi.org/10.1007/s10899-022-10124-8

Macía, L., Jauregui, P., & Estévez, A. (2023). Emotional dependence as a predictor of emotional symptoms and substance abuse in individuals with gambling disorder: Differential analysis by sex. *Public Health, 223*, 24-32. https://doi.org/10.1016/j.puhe.2023.07.023

Macía, L., Jauregui, P., Herrero, M., Iruarrizaga, I., Micó, V., Lamas, J., & Estévez, A. (2023). Sex-Comparative study of gambling disorder regarding alexithymia and symptoms of depression, anxiety and hostility. *Comprehensive Psychiatry, 122*, 152364. https://doi.org/10.1016/j.comppsych.2023.152364

Maraz, A., Griffiths, M. D., & Demetrovics, Z. (2016). The prevalence of compulsive buying: A meta-analysis. *Addiction, 111*(3), 408–419. https://doi.org/10.1111/add.13223

Marcet, D. D., Toledo, A. V., Vicente, N. A., & Casals, M. S. (2016). El trastorno de compra compulsiva [Compulsive buying disorder]. *Cuadernos de Medicina Psicosomática y Psiquiatria de Enlace, 117*, 11-16.

Marcos, M., & Chóliz, M. (2019). Mujer y juego online. Propuesta de tratamiento de un caso de adicción a videobingo [Women and online gambling. Proposed treatment of a case of video bingo addiction]. *Información Psicológica*, *117*, 99-114. https://doi.org/10.14635/IPSIC.2019.117.7

McCormack, A., Shorter, G. W., & Griffiths, M. D. (2014). An empirical study of gender differences in online gambling. *Journal of Gambling Studies, 30*(1), 71-88. http://dx.doi.org/10.1007/s10899-012-9341-x

McHugh, R. K., Votaw, V. R., Sugarman, D. E., & Greenfield, S. F. (2018). Sex and gender differences in substance use disorders. *Clinical Psychology Review, 66*, 12–23. https://doi.org/10.1016/j.cpr.2017.10.012

McKee, S. A., & McRae-Clark, A. L. (2022). Consideration of sex and gender differences in addiction medication response. *Biology of sex Differences, 13*(1), 34.https://doi.org/10.1186/s13293-022-00441-3

McLean, L., & Griffiths, M.D. (2019). Female gamers' experience of online harassment and social support in online gaming: A qualitative study. *International Journal of Mental Health and Addiction, 17*, 970–994. https://doi.org/10.1007/s11469-018-9962-0

Mestre-Bach, G., Granero, R., Mora-Maltas, B., Valenciano-Mendoza, E., Munguía, L.,

Potenza, M. N., Derevensky, J. L., Richard, J., Fernández-Aranda, F., Menchón, J. M., & Jiménez-Murcia, S. (2022). Sports-betting-related gambling disorder: Clinical features and correlates of cognitive behavioral therapy outcomes. *Addictive Behaviors, 133*, 107371. https://doi.org/10.1016/j.addbeh.2022.107371

Molinaro, S. & Baroni, M. (2024). A proposito di. . . donne (giovani e meno giovani) e gioco d'azzardo [About... (young and old) women and gambling]. *Fondazione Varenna*. Retrieved from: https://www.fondazionevarenna.it/a-proposito-di-donne-giovani-e-meno-giovani-e-gioco-dazzardo/

Mueller, A., Mitchell, J. E., Crosby, R. D., Gefeller, O., Faber, R. J., Martin, A., Bleich, S., Glaesmer, H., Exner, C., & de Zwaan, M. (2010). Estimated prevalence of compulsive buying in Germany and its association with sociodemographic characteristics and depressive symptoms. *Psychiatry Research, 180*(2-3), 137–142. https://doi.org/10.1016/j.psychres.2009.12.001

Muñoz, M., Fernández, J., & Sánchez, F. (2019). Comportamiento de compra racional e impulsiva de los jóvenes estudiantes en los centros comerciales [Rational and impulsive buying behavior of young students in shopping malls]. *RAN-Revista Academia & Negocios, 5*(1), 61-70.

Nicoli de Mattos, C., Kim, H. S., Requião, M. G., Marasaldi, R. F., Filomensky, T. Z., Hodgins, D. C., & Tavares, H. (2016). Gender differences in compulsive buying disorder: Assessment of demographic and psychiatric comorbidities. *PloS One, 11*(12), e0167365. https://doi.org/10.1371/journal.pone.0167365

Observatorio Español de las Drogas y las Adicciones (OEDA). (2022). *Informe sobre trastornos comportamentales 2022: juego con dinero, uso de videojuegos y uso compulsivo de internet en las encuestas de drogas y otras adicciones en España EDADES y ESTUDES* [Behavioural Disorders Report 2022: Gambling with money, use of video games and compulsive use of the Internet in surveys of drugs and other addictions in Spain EDADES and ESTUDES]. Ministerio de Sanidad. Delegación del Gobierno para el Plan Nacional sobre Drogas.

Observatorio Español de las Drogas y las Adicciones (OEDA). (2023). *Informe sobre trastornos comportamentales 2023: juego con dinero, uso de videojuegos y uso compulsivo de internet en las encuestas de drogas y otras adicciones en España EDADES y ESTUDES* [Behavioural Disorders Report 2023: Gambling with money, use of video games and compulsive use of the Internet in surveys of drugs and other addictions in Spain EDADES and ESTUDES]. Ministerio de Sanidad. Delegación del Gobierno para el Plan Nacional sobre Drogas.

Petry, N. (2003). A comparison of treatment-seeking pathological gamblers based on preferred gambling activity. *Addiction*, *98*(5), 645-655. https://doi.org/10.1046/j.1360-0443.2003.00336.x

Potenza, M. N., Steinberg, M. A., McLaughlin, S. D., Wu, R., Rounsaville, B. J., & O'Malley, S. S. (2001). Gender-related differences in the characteristics of problem gamblers using a gambling helpline. *The American Journal of Psychiatry*, *158*(9), 1500–1505. https://doi.org/10.1176/appi.ajp.158.9.1500

Prever, F., Blycker, G., & Brandt, L. (Eds.). (2023). *Behavioural addiction in women: An international female perspective on treatment and research* (1st ed.). Routledge. https://doi.org/10.4324/9781003203476

Rehbein, F., Staudt, A., Hanslmaier, M. & Kliem, S. (2016). Video game playing in the general adult population of Germany: Can higher gaming time of males be explained by gender specific genre preferences? *Computers in Human Behavior, 55,* 729-735. https://doi.org/10.1016/j.chb.2015.10.016

Ricoy, C., & Ameneiros, A. (2016). Preferences, dedication and problematics generated by video games: A gender perspective. *Revista Complutense de Educación, 27*(3), 1291-1308. https://doi.org/10.5209/rev_RCED.2016.v27.n3.48445

Rius Buitrago, A., Soriano Villarroel, I., & Lopez Gonzalez, H. (2021). 'Yo sabía que nadie me iba a juzgar': La adicción al juego online desde la perspectiva de género ['I knew no

one was going to judge me': Online gambling addiction from a gender perspective]. MUSAS. *Revista de Investigación en Mujer, Salud y Sociedad, 6*(1), 138-155. https://doi.org/10.1344/musas2021.vol6.num1.8

Rodríguez, M. L., Saucedo, J. M., Hernández, A., & Gutiérrez, O. C. (2016). Análisis Del Comportamiento de compra para identificar compradores compulsivos en Saltillo, Coahuila México (Purchase behavior analysis to identify compulsive shoppers in Saltillo, Coahuila Mexico). *Revista Internacional Administración & Finanzas, 5*(5), 27-44.

Santolaria Gómez, R., Estévez Gutiérrez, A., Aonso Diego, G. (2024). *Análisis de situación de ideación y conducta suicida en población con trastorno por juego de FEJAR* [Analysis of the situation of suicidal ideation and behavior in the population with gambling disorder by FEJAR]. A Coruña. FEJAR - Federación Española de Jugadores de Azar Rehabilitados (Spanish Federation of Rehabilitated Gamblers); https://fejar.org/que-hacemos/publicacion/

Schaab, M. (2014). Compra compulsiva y autoconcepto en mujeres adultas medias [online].[[Compulsive buying and self-concept in average adult women [online]]. Bachelor's Psychology Thesis. Universidad Católica Argentina, Facultad Teresa de Ávila, Departamento de Humanidades. Retrieved from: https://repositorio.uca.edu.ar/handle/123456789/600

Sioni, S. R., Burleson, M. H., & Bekerian, D. A. (2017). Internet gaming disorder: Social phobia and identifying with your virtual self. *Computers in Human Behavior, 71*, 11–15. https://doi.org/10.1016/j.chb.2017.01.044

Stevens, M. W. R., Dorstyn, D., Delfabbro, P. H., King, D. L. (2021). Global prevalence of gaming disorders: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry, 55*(6), 553-568. https://doi.org/10.1177%2F0004867420962851

Stavropoulos, V., Kuss, D. J., Griffiths, M. D., Wilson, P., & Motti-Stefanidi, F. (2017). MMORPG gaming and hostility predict Internet Addiction symptoms in adolescents: An empirical multilevel longitudinal study. *Addictive Behaviors, 64*, 294–300. https://doi.org/10.1016/j.addbeh.2015.09.001

Uzarska, A., Czerwiński, S. K., & Atroszko, P. A. (2021). Measurement of shopping addiction and its relationship with personality traits and well-being among Polish undergraduate students. *Current Psychology*, *42*(5), 3794–3810. https://doi.org/10.1007/s12144-021-01712-9

Vázquez, J. M. F. (2012). Ludopatía y mujer: un análisis desde la perspectiva de género. *Investigación y género. Inseparables en el presente y en el futuro: IV Congreso Universitario Nacional "Investigación y Género"* [Gambling addiction and women: An analysis from the gender perspective. Research and gender. Inseparable in the present and the future: IV National University Congress "Research and Gender". Seville, 21 and 22 June 2012 (pp. 2097-2107).] (pp. 2097-2107). *Unidad para la Igualdad* [Unity for Equality]. Retrieved from: https://idus.us.es/handle/11441/40956

Vollmer, C., Randler, C., Horzum, M. B. & Ayas, T. (2014). Computer game addiction in adolescents and its relationship to chronotype and personality. *SAGE Open, 4*(1), 1-9. https://doi.org/10.1177/2158244013518054

Wang, H. R., Cho, H., & Kim, D. J. (2018). Prevalence and correlates of comorbid depression in a nonclinical online sample with DSM-5 internet gaming disorder. *Journal of Affective Disorders, 226*, 1–5. https://doi.org/10.1016/j.jad.2017.08.005

Wong, G., Zane, N., Saw, A., & Chan, A. K. (2013). Examining gender differences for gambling engagement and gambling problems among emerging adults. *Journal of Gambling Studies*, 29(2), 171–189. https://doi.org/10.1007/s10899-012-9305-1

World Health Organization. (2019). *International statistical classification of diseases and related health problems, 11th Revision (ICD-11)*.

Zakiniaeiz, Y. & Potenza, M. N. (2018). Gender-related differences in addiction: a review of human studies. *Current Opinion in Behavioral Sciences*. 23:171-175. doi: 10.1016/j.cobeha.2018.08.004. Epub 2018 Aug 24. PMID: 39896826; PMCID: PMC11784943.

12

BEHAVIORAL ADDICTIONS AND STIGMA

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ABSTRACT:

The study of stigma is crucial to our understanding of the lived experiences of people affected by behavioral addictions. This chapter explains the formulation of stigma in behavioral addiction research, its frequency, predictors, and the public health approaches to addressing stigma. Stigma can engender blame and avoidance behaviors towards people with behavioral addictions and negative stereotypes such as being 'weak' or 'lazy'. Current research has mostly focused on the public stigma of gaming and gambling disorder. In gambling studies, research suggests that about half of adult participants report stigmatizing attitudes towards someone with gambling disorder. Experimental research shows that labelling someone with a behavioral addiction diagnosis can increase stigma compared to people without diagnoses, whereas neurobiological explanations for behavioral addictions can reduce blame towards people with these problems. Public health recommendations for addressing stigma include using person-first and non-blaming language, person-centered practice, educational resources, and training programs. Future research should focus on improving our understanding of stigma in addictive disorders and investigating ways to reduce stigma among individuals living with and affected by these conditions.

KEYWORDS:

stigma, public health messaging, labelling, prejudice, discrimination

1. INTRODUCTION

Stigma is defined as a socially discrediting attribute and can involve prejudice, devaluation, and discrimination (Yang et al., 2007). Stigma is a common experience of people suffering from a range of mental illnesses, including behavioral addictions, which can affect their likelihood of seeking or receiving treatment and have further negative consequences for their wellbeing (Angermeyer & Matschinger, 2003; Carroll et al., 2013; Feldman & Crandall, 2007; O'Connor et al., 2020; Teachman et al., 2006; Weiss et al., 2006). Substance use disorders, such as alcohol use disorder or other drug addictions, are known to generate more stigma than a range of other physical and mental health conditions (Kilian et al., 2021). Therefore, it is important to investigate whether behavioral addictions also generate high levels of stigma similar to substance use disorders as part of the broader addiction category. Stigma has been a point of contention regarding the diagnostic categories for behavioral addictions, particularly gaming disorder (Aarseth et al., 2017; Galanis et al., 2021; van Rooij et al., 2018), regarding whether these categories might affect attitudes towards the associated non-problematic involvement with these activities. Although most stigma research has focused on gambling disorder, there is growing research into emerging categories, particularly technology-based and food addictions (Casale et al., 2023; Galanis et al., 2023; Peter et al., 2019; Ruddock et al., 2019).

Stigma has multiple dimensions. Table 1 provides a summary of the definitions of different types of stigma; self-stigma, stigma by association, public stigma, and structural stigma (Bos et al., 2013; Overton & Medina, 2008). Understanding these different types of stigma is important for health practitioners as it relates to the experiences of people living with a behavioral addiction, its impact on psychological distress (Ahorsu et al., 2020; Fung et al., 2021), and as a barrier to help-seeking (Rolando et al., 2023; Wu et al., 2011).

2. THEORIES OF STIGMA

Although there are four types of stigma, this chapter focuses on theories related to public and self-stigma as these two types of stigma feature in academic research about stigma (Galanis et al., 2025). Figure 1 summarizes the common features (Corrigan, 2000) of five models of stigma, including a process and a co-occurring component model of stigma for both public and self-stigma, as well as an additional public stigma model that provides processes related to more specific stereotypes (Corrigan et al., 2003). Social–cognitive models of stigma are commonly employed in stigma research and theorize stigma processes and the relationship between public and self-stigma (Corrigan et al., 2009). In public stigma models, Corrigan (2000) has described diagnostic labels or other indicators of mental illness as providing a basis for stereotyping and prejudice. This prejudice can lead to negative behaviors, such as hostility, discrimination (e.g., housing, employment, treatment), and most notably, avoidance (Corrigan, 2000). Other researchers have proposed that the social–cognitive models can also be theorized as co-occurring components rather than a process model (Link & Phelan, 2001; Link et al., 2004).

Table 1. *Definitions of types of stigma applied to behavioral addictions*

Stigma Type	Definition	Example
Self-Stigma	Negative attitudes held by a person with a behavioral addiction towards themself.	"I currently respect myself less because I..." have a gambling problem (Horch & Hodgins, 2015).
Stigma by Association	Experience of negative reactions from others due to associating with someone with a behavioral addiction.	Choosing to avoid or feeling anger towards someone because they are related to a person who has a gambling problem (Bos et al., 2013).
Public Stigma	Community members have negative attitudes or behaviors towards people with behavioral addictions.	Choosing to avoid or feeling anger towards someone because they have a gambling problem (Peter et al., 2019).
Structural Stigma	Laws and institutions have biases that support discrimination against people with a behavioral addiction.	Criminalization of gambling leads to punishments of people with a gambling problem (Hemeida & Goldberg, 2022).

2.1 Public Stigma

Public stigma is the most commonly studied type of stigma in addiction research (Galanis et al., 2025). Attribution theory and the danger appraisal hypothesis have been used to understand public responses to people with behavioral addictions (e.g., Galanis et al., 2023; Peter et al., 2019). These two conceptualizations of stigma describe specific stereotypes including the attribution of blame or dangerousness to someone as leading

to more stigma compared to when less blame or dangerousness are attributed to a person with mental illness (Corrigan, Markowitz, et al., 2003). Attribution theory and the danger appraisal hypothesis also propose that emotional reactions mediate the relationship between stereotyping and behavioral reactions (Corrigan, Markowitz, et al., 2003). Emotions like pity are proposed to lead to helping behaviors whereas anger and fear can lead to discriminatory behaviors (Corrigan, Markowitz, et al., 2003).

Attribution theory and the danger appraisal hypothesis explain that people with gaming or gambling problems may experience more stigma than non-clinical distressed populations due to greater attributions of blame and dangerousness (Peter et al., 2019). This has been demonstrated in studies using vignettes to examine participants' responses to different profiles of individuals. A study by Peter et al. (2019) surveyed participant attitudes towards one of four vignettes depicting a person experiencing problem gaming, problem gambling (eSports or casino gambling), or distress resulting from a financial crisis. Peter et al. (2019) reported that the gambling vignettes were perceived as more dangerous than the financial crisis vignette, and this dangerousness could explain why participants also desired more social distance from people with a gambling problem than someone experiencing subclinical distress.

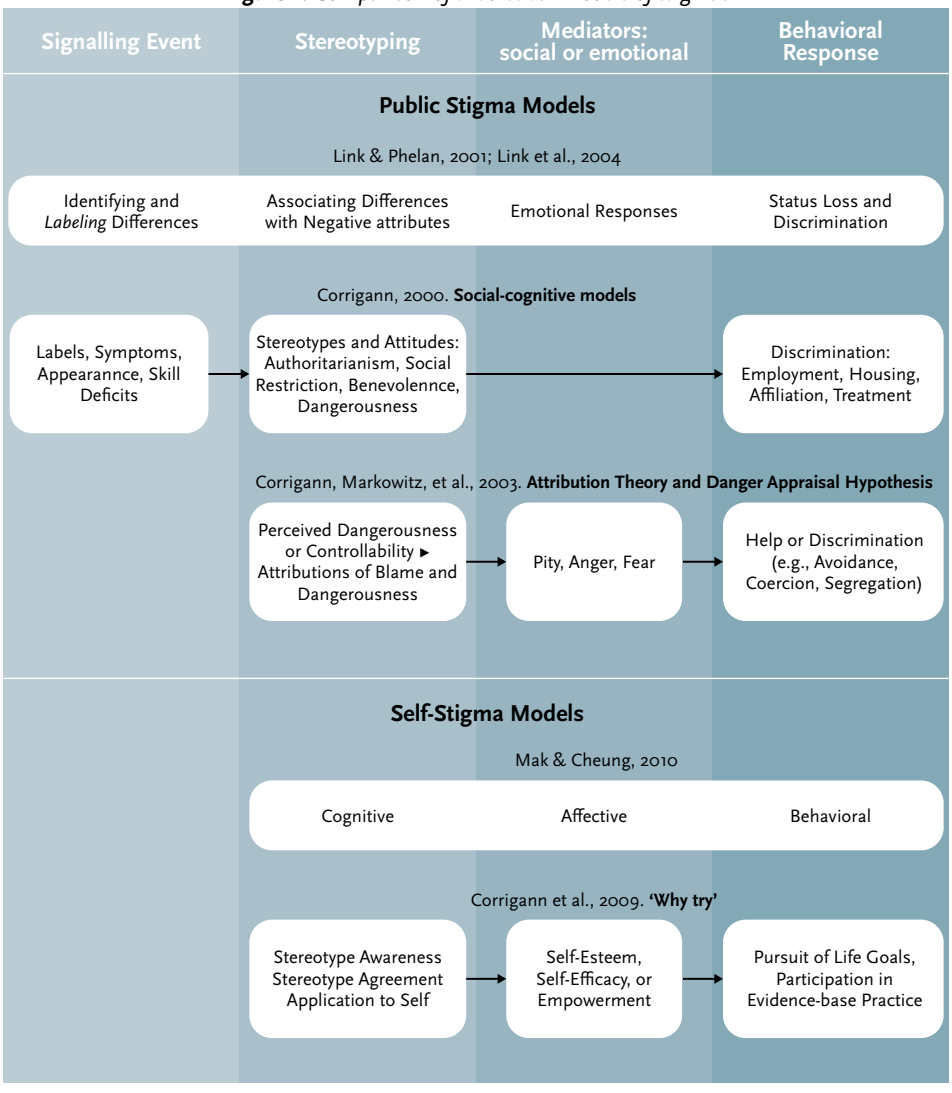
2.2 Self-Stigma

In social–cognitive models, self-stigma describes how stereotyping of people with a behavioral addiction can cause reductions in self-esteem and self-efficacy (Corrigan et al., 2009). These models can be described as interrelated cognitive (i.e., thoughts like negative stereotypes), affective (i.e., emotions like anger or shame), and behavioral features (e.g., treatment seeking or treatment avoidance; Mak & Cheung, 2010). Self-stigma processes involve a person with a behavioral addiction becoming *aware* of public stereotypes about their disorder, *agreeing* with these stereotypes, and then *applying* the stereotypes to themselves (Corrigan et al., 2009). Applying stereotypes to oneself can cause poor self-esteem and self-efficacy or empowerment, and subsequently lead to behavioral outcomes. Some individuals can feel empowered to challenge the stereotypes and are motivated to engage in treatment, whereas those who experience a negative impact on their self-esteem may be less likely to engage in treatment; this phenomenon is referred to as the 'why try' effect (Corrigan et al., 2009).

Studies have investigated the impact of awareness or perceptions of public stigma on self-stigma in relation to behavioral addictions by surveying people who experience gambling problems. One study reported that expectations of public stigma towards people who experience problem gambling were positively related to self-stigma including feelings of shame, inadequacy, or weakness (Hing & Russell, 2017a). Another study reported that perceptions of public stereotypes and experiences of stigma were associated with a lower likelihood of seeking treatment for gambling problems (Andrà et al., 2021). These studies support the relationship between awareness of public stereotypes and application of stereotypes to oneself related to self-stigma models and the subsequent

impact on behavioral outcomes such as treatment engagement. Additionally, Chang et al. (2023) surveyed people with substance use disorders and reported that cognitive, affective, and behavioral stigmas of their substance use disorder were positively related to one another. The cognitive, affective, and behavioral aspects of self-stigma related to their substance use disorder had positive relationships with problem smartphone, social media, and gaming use (Chang et al., 2023). This suggests that technology-based behavioral addictions may increase due to self-stigma of other problems, such as substance use disorders.

Figure 1. *Comparison of theoretical models of stigma.*



3. NATURE, SEVERITY, AND PREVALENCE OF STIGMA

3.1 Nature of Stigma in Behavioral Addictions

Research in behavioral addictions is beginning to identify and measure some of the public perceptions of these conditions. One of the challenges in this area is directly observing or measuring stigma. The main way in which studies have attempted to measure stigma is using vignette-based experimental designs, where participants are asked to respond to a brief description of someone with a gambling or gaming problem to examine features of stigma. The specific indicators of stigma vary across studies but often include ratings of the degree that the person depicted is responsible for their condition, is dangerous, and should be socially avoided. Participants in these vignette studies tend to report higher blame and a desire to avoid interactions towards individuals described as experiencing a behavioral addiction compared to descriptions of people non-clinical problems (Galanis et al., 2023; Li & Whelan, 2024; Peter et al., 2019). Other perceptions have included dangerousness, devaluation, fear, anger, and discrimination (Galanis et al., 2023; Li & Whelan, 2024; Peter et al., 2019). A vignette-based study of problem and non-problem gaming reported that addiction explanations of gaming had a negligible impact on stigma compared to non-addiction explanations effects on stigma (Galanis et al., 2023). However, participants' blame ratings reduced as descriptions shifted from recreational to more problematic gaming (Galanis et al., 2023).

Other vignette-based research has reported that participants rated vignettes of individuals who engaged in casino gambling, eSports gambling, and online gaming more highly on measures anger, avoidance, and support for coercive treatment strategies as compared to individuals with subclinical distress due to financial crisis (Li & Whelan, 2024; Peter et al., 2019). This study also reported that the gambling and gaming conditions were associated with more blame and willingness to help compared to the financial crisis vignette (Peter et al., 2019). The gambling individuals were associated with more danger and fear than the person in financial crisis; specifically, the casino gambler generated fewer help responses, and the eSports gambler generated more support for segregation than the individual in a financial crisis (Peter et al., 2019). These studies demonstrate that participants tend to report more desire to avoid individuals with behavioral addictions compared to people with subclinical problems, but participants have mixed emotional reactions across studies.

Research has identified negative public stereotypes towards gamers (Kowert et a., 2012, 2014). An online survey by Kowert et al. (2012) in which participants were asked to rate how applicable certain traits were to people who play online games, reported that they were viewed as unattractive, unpopular, lazy, and having poor social skills. Kowert et al. (2012) noted that views did vary and that this reflected that negative attitudes towards gamers may be shifting. Qualitative research has reported that people who game experience stereotypes such as nerdy or geeky, useless, lazy, unambitious, wasting time, lost or without a life, rude, dangerous, and toxic (Galanis & King, 2025). Similarly,

a review of media portrayals of people who play games noted that they are depicted on television shows as eating poorly, unkempt, and being homophobic (Bergstrom et al., 2016). These findings regarding attitudes towards people who play games highlight how negative stereotypes about non-problematic involvement in an activity can arise and that this stigma may compound in the context of addiction.

Interview-based research has reported that people with gambling problems experience feelings such as shame, blame, stupidity, inadequacy, feeling weak, and fears of others learning about their problems (Carroll et al., 2013). In this study, participants had the opportunity to provide insights into their condition, lived experiences, and the nature of self-stigma in gambling disorder. Denial of problems due to shame was reported to be the first barrier to receiving treatment (Carroll et al., 2013). However, people with gambling problems did not conceptualize their experiences of shame and denial as self-stigma (Carroll et al., 2013). Qualitative research involving interviews with women with gambling disorder had a similar emphasis on shame and feeling like a failure, as well as guilt, feeling like they are a burden, and being disgusted with themselves (Karlsson et al., 2023).

3.2 Comparing Stigma for Behavioral Addictions with other Conditions

There have been debates about whether emerging categories of behavioral addictions might attract negative attitudes given that substance use disorders are among the most stigmatized conditions. Substance use disorders have been reported to elicit more stigma, in terms of either frequency or severity, than many other physical and mental health conditions (Elflein, 2021; Kilian et al., 2021). Studies have evaluated differences between gambling disorder and other conditions. Participants reported that gambling disorder was perceived as less inherent or less likely to be due to a chemical imbalance and more likely due to bad character than schizophrenia (Hing, Russell, Gainsbury, & Nuske, 2016). However, it was also seen as less dangerous, less noticeable, less disruptive, and more recoverable than schizophrenia (Hing, Russell, Gainsbury, & Nuske, 2016). Another vignette-based study reported that participants were more likely to perceive people with gambling disorder as dangerous and desiring more social distance than for someone with cancer (Horch & Hodgins, 2008). Quigley et al. (2020) reported that gambling disorder and compulsive buying disorder were more stigmatized than depression, obsessive–compulsive disorder, and asthma.

Several studies have compared behavioral addictions and substance use disorders. Vignettes or labels related to gambling disorder are reported to attract similar amounts of stigma (i.e., avoidance) to alcohol or heroin use disorder with people who experience these problems (Lang & Rosenberg, 2017; Quigley et al., 2020). Other studies reported that recognized addictive behaviors, such as gambling disorder, and proposed but not yet recognized addictive behaviors such as food addiction and pornography addiction, tended to be less stigmatized than substance use disorders related to alcohol or heroin use (DePierre et al., 2013; Hing et al., 2016; Horch & Hodgins, 2008). Addictive use of pornography and gambling were comparable to cannabis use disorder in terms of

willingness to associate (Lang & Rosenberg, 2017). However, Lang and Rosenberg (2017) noted that there was a general unwillingness to associate with a person with an addictive disorder regardless of whether it was a substance use disorder or behavioral addiction. These studies comparing behavioral addictions to substance use disorders or other conditions, indicate that behavioral addictions receive more stigma compared to other physical and mental health conditions. Overall, the research suggests that gambling disorder may be among the most stigmatized behavioral addictions, while other addictive behaviors may receive somewhat less stigma than most substance use disorders.

3.3 Frequency and Prevalence of Stigma

Stigma is a common experience among people with mental illness (Corrigan, Thompson, et al., 2003; Link, 1987). Research indicates that more than half (51.7%) of adults have stigmatizing attitudes towards someone with gambling disorder (Hing et al., 2016). This is comparable to reports of discrimination (53%) by participants with severe mental illness (Corrigan, Thompson, et al., 2003). However, behavioral addiction stigma research is yet to report on frequencies of other types of behavioral addictions, other types of stigma (e.g., self-stigma), or use representative samples. A review of stigma in substance use disorders and behavioral addictions reported that 28 to 76.5% of people stigmatize those who experience an addiction (Galanis et al., 2025). This wide variance may reflect variance in stigma attributed to different diagnoses or sub-populations of people with an addictive disorder, or indicate different definitions for categorizing stigma (Galanis et al., 2025). Although the current research on frequency of gambling disorder stigma places it in the middle of this range, similar variation may be expected as more research investigates and reports on the frequency of stigma for behavioral addictions.

4. CORRELATES & PREDICTORS OF STIGMA

4.1 Familiarity

The impact of familiarity with a mental illness on stigma has theoretical foundations in the '*Contact Hypothesis*' (Couture & Penn, 2003). The Contact Hypothesis stipulates that positive interactions, particularly those involving teamwork, with members of a stigmatized group may reduce stigma if the experiences are generalized towards the rest of the outgroup (Dovidio et al., 2003). This theory has been applied to a range of different stigmatized identities, including mental illness (Maunder & White, 2019), substance use disorders (Pfitzner & Kapitány-Fövény, 2018), race (Amir, 1969), physical illness (e.g., HIV; Chan & Tsai, 2017), and sexuality (i.e., lesbian, gay, or bisexual individuals; Loehr et al., 2015). Familiarity with stigmatized people has been considered in several studies of stigma related to behavioral addictions focusing on gaming and gambling disorder (Hing, Russell, Gainsbury, & Nuske, 2016; Hing, Russell, & Gainsbury, 2016; Horch & Hodgins, 2008; Lang & Rosenberg, 2017; Peter et al., 2019). Contact with people with

lived experience with a disorder is commonly used in programs designed to reduce stigma and has also been used for stigma towards behavioral addictions (i.e., gambling disorder; Brown & Russell, 2019).

4.1.1 *Evidence in Behavioral Addiction Research*

Correlational Research

Studies that have investigated the effect of familiarity on public stigma by measuring the amount of past contact they have had with people with behavioral addictions, have reported mixed effects. Two studies examining gambling disorder, using the same dataset, reported small negative relationships between levels of contact with people with gambling disorder and desired social distance from problem gamblers (Hing, Russell, Gainsbury, & Nuske, 2016; Hing, Russell, & Gainsbury, 2016). However, two other survey-based studies examining attitudes towards people with gambling problems reported that previous contact with gambling disorder was not correlated to future willingness to associate with them (Lang & Rosenberg, 2017; Horch & Hodgins, 2008).

Peter et al.'s (2019) study involved asking participants to respond to vignettes depicting a person with gambling problems (i.e., a casino gambler or eSports gambler) or gaming problems. The level of familiarity with mental illness had small negative relationships with perceived danger and fear, and a small positive relationship to pity toward people with gaming and gambling problems (Peter et al., 2019). However, the level of familiarity with mental illness was not significantly related to social distance, avoidance, blame, anger, helping behavior, or support for segregation or coercive treatment (Peter et al., 2019). This study was the only one to measure contact with severe mental illness, rather than problem gaming or gambling specifically, and these findings indicate that contact with mental illness may have limited generalizability to perceptions of behavioral addictions.

Experimental Research

Research has experimentally manipulated contact with people with gambling disorder by employing video footage of people who have experienced gambling problems (Brown & Russell, 2020). On the Level of Contact Report (LOCR), a measure of familiarity commonly used in stigma research, video footage would be most similar to watching a movie or television show about someone with a disorder. Video footage is generally scored as 3 out of a possible 12 on the LOCR, indicating a low level of contact (Holmes et al., 1999). This video-based intervention increased perceived dangerousness, pity, and social distance, but reduced fear of people with a gambling addiction (Brown & Russell, 2019). Although survey-based studies have provided mixed evidence of familiarity in relation to gambling and gaming disorder, this study indicates that contact may worsen stigma.

Impact of the Level and Nature of Contact

Some theories about familiarity describe a U-shaped curve, where stigma is lowest when familiarity with a stigmatized group is moderate, and stigma is higher when familiarity

is either very low or very high (Corrigan & Nieweglowski, 2019). As familiarity passes the mid-point of the scale, people experience greater burden due to their relationship with the person with a behavioral addiction, either due to responsibilities of helping to care for the person or due to experiencing stigma themselves due to their association with the person (Corrigan & Nieweglowski, 2019). This U-shaped relationship between stigma and familiarity could explain the mixed findings across studies if analyses do not consider non-linear relationships.

An alternative explanation for inconsistent relationships between familiarity and stigma could be related to the quality of the contact with people with a behavioral addiction (Couture & Penn, 2003). Studies of familiarity in behavioral addiction stigma have merely assessed contact and not whether they had positive experiences, which can reduce stigma, or negative experiences which may increase stigma (Couture & Penn, 2003). The contact hypothesis predicts that people generalize their experiences with the stigmatized person to the rest of that group to influence stigma; therefore, contact may increase stigma if the contact is not positive (e.g., Brown & Russell, 2019).

4.2 Labelling

The social–cognitive model of mental illness stigma, described earlier in this chapter, explains how diagnostic labels might be more likely to generate stigmatizing perceptions of someone with a behavioral addiction, compared to someone without a diagnosis, by providing a basis for stereotyping (Corrigan, Markowitz, et al., 2003). Vignette-based experiments have compared the impact of presenting vignettes that either inform the participant that the depicted character has a diagnosis or present the fictional person's symptoms or impairment without mention of a diagnosis. These studies have investigated food addiction (Bannon et al., 2009; Ruddock et al., 2019), gaming and gambling disorder (Peter et al., 2019), and compulsive sexual behavior disorder (Klein et al., 2019). These studies reported that addiction diagnosis labels increased stigma relative to no diagnosis control conditions. This effect occurred even when it was a self-diagnosed addiction, not just when diagnosed by a medical practitioner (Ruddock et al., 2019), and when the control condition was matched on impairment but where the impairment was attributed on non-clinical problems (i.e., financial crisis; Peter et al., 2019).

4.3 Psychological Distress

Surveys of self-stigma have reported positive correlations with psychological distress or well-being related variables and self-stigma among people suffering from behavioral addictions. This includes a positive relationship between psychological distress and self-stigma in a study of gambling disorder ($r = .44$; Hing & Russell, 2017b), and psychological distress and weight stigma ($r = .15$) in a study of binge eating and food addiction (Ahorsu et al., 2020). Negative mood can have a priming effect which may lead to perceiving more stigma or more internalized stigma (Ottati et al., 2005). Another explanation is that people with higher psychological distress perceive less self-stigma

following treatment due to reduced symptoms and subsequent reductions in discrimination (Ertl et al., 2021). This explanation could be relevant as people with a behavioral addiction often experience more distress as symptoms of their addiction worsen (Fung et al., 2021; Hing & Russell, 2017b; Lee et al., 2023). Although bidirectional relationships cannot be ruled out from these correlational studies, there is evidence of a "negative" relationship between self-stigma and well-being among people with a behavioral addiction.

Additionally, another study before, during, and after Covid-19 lockdowns showed that problem smartphone use and problem social media use were positively related to anxiety, depression and stress, mediated by perceived weight stigma (Fung et al., 2021). Another study reported that problem gaming, problem smart phone use and problem phone use were related to psychological distress and self-stigma of ADHD (Lee et al., 2023). In this study, self-stigma is shown to mediate the relationship between addictive use of mobile phones or social media and symptoms of stress, anxiety, or depression. These studies show that behavioral addictions can contribute to further self-stigmatization in other comorbidities and have a negative impact on mental health (Fung et al., 2021; Lee et al., 2023).

4.4 Neurobiological Explanations of Behavioral Addictions

Studies on public stigma of food addiction, gambling disorder, and gaming disorder, have examined the effect of neurobiological or genetic explanations for behavioral addictions on stigma (Brown & Russell, 2019; Galanis et al., 2023; Latner et al., 2019; Lebowitz & Appelbaum, 2017). Brown and Russell (2015) reported that an education intervention, which provided some details on the neurobiology of gambling, reduced negative stereotyping and anger towards people with gambling disorder. Studies providing an addiction explanation for over-eating or problem gaming reported reductions in blame when compared to participants who read non-addiction explanations for these problems (Galanis et al., 2023; Latner et al., 2019). However, addiction explanations also led to increases in perceptions of impairment and distrust of people with problematic gaming (Galanis et al., 2023), but did reduce some stigmatizing judgements for people who overeat (Latner et al., 2019).

Emphasizing biological causes of a behavioral addiction might make it seem more inherent in the individual and therefore they are less blameworthy (Kvaale et al., 2013; Loughman & Haslam, 2018). However, this may also make the illness seem more dangerous and desiring greater social distance (Kvaale et al., 2013; Loughman & Haslam, 2018). This was consistent with a review by Angermeyer et al. (2011) which reported that responsibility for a person's condition was mostly unrelated to discrimination, contrary to social–cognitive models of stigma. Additionally, the studies of behavioral addiction stigma offer some support for the impact of biological explanations reducing blame but having negative outcomes on other stigmatizing judgements. Research has identified differences in causal attributions for substance use disorders and behavioral addictions, where substance use disorders are more likely to be seen as due to the addictive properties of the substance use disorders and behavioral addictions due to a character

flaw (Konkolÿ Thege et al., 2015). Therefore, neurobiological explanations or the use of addiction terminology (Himelein-Wachowiak et al., 2022) may be suitable for addressing some of the blame attributed to people with a behavioral addiction.

5. RESPONSES TO STIGMA IN RESEARCH, PREVENTION, AND CLINICAL PRACTICE

Although anti-stigma recommendations in public health are scarce for behavioral addictions, recommendations from other areas could be adopted or applied to treatment of behavioral addictions. For example, guidelines for clinicians are provided for treatment of alcohol problems which the practice, use of non-stigmatizing language person-centered practice, and engaging in anti-stigma training programs (Riordan et al., 2021).

5.1 Language

The importance of language has been noted with respect to research and public messaging campaigns about gambling problems (Blaszczynski et al., 2020). Public health messaging may have unintended negative consequences on attitudes towards people with gambling problems when personal responsibility is emphasized (Miller & Thomas, 2018). For example, the *'gamble responsibly'* campaign that was run in Australia and other jurisdictions implies blame, irrespective of a person's capacity to control their gambling behavior and may generate shame among people with problems (Miller & Thomas, 2018; Visentin, 2022).

A review of stigmatizing language also recommends the use of person-first and inclusive language, and to avoid labels, pejorative terms, attributing blame, or undermining their experiences (Healy et al., 2022). Many of these recommendations may already be the norm in treatment of other mental illnesses, but some consideration may need to be made for behavioral addictions. For example, being careful with language such as 'nerd' or 'geek' which may relate specifically to stereotypes of people with gaming disorder (Kowert et al., 2012) or validating the client or patient's experiences even in instances where their problems are not formally recognized in diagnostic classification systems.

Research has also demonstrated instances where language may not affect stigma. Quigley et al. (2020) reported that different labels for problem gambling (i.e., problem gambling, pathological gambling, gambling disorder, gambling addiction) did not generate different stigma responses. Similarly, addiction terminology to describe problem gaming was reported to have minimal impact on stigma towards people who game (Galanis et al., 2023).

5.2 Person-Centered Practice

Person-centered practice involves compassion, respect, and including patients or clients in decision-making about their treatment (Sharma et al., 2015). Many aspects of

person-centered practice, such as compassion and respect, are likely to be universal across clinical practice of mental illnesses and may interrelate. For example, actively involving a patient or client in decision-making about their treatment could be a way of demonstrating respect. Some factors of person-centered care like *getting to know the person* or *communication* may need specific considerations for some behavioral addictions. This could include involving family members for addictions such as gaming disorder that often affect adolescents and where parental behavior is known to impact the condition and case formulation (Bonnaire et al., 2019; Li et al., 2019).

5.3 Anti-Stigma Intervention Programs

Stigma reduction initiatives involve education or contact with members of the stigmatized group. Education interventions involve providing participants with information about their condition; this can be done in range of modalities such as a workshop, classwork, video, or online (Bielenberg et al., 2021). Comparatively, contact interventions aim to reduce stigma among members of the public but often focus on treatment providers (Bielenberg et al., 2021). Treatment providers are considered an important population for focusing on stigma reduction efforts, to ensure that access to treatment and the quality of care is not negatively affected for people with behavioral addictions (Quigley, 2022). Contact interventions can involve having participants interact with people who have lived experiences with people with behavioral addictions (Bielenberg et al., 2021). Only two studies have investigated intervention programs for behavioral addiction stigma (Brown & Russel, 2019; Thomas et al., 2024). However, studies of neurobiological explanations for behavioral addictions can also inform education interventions (Galanis et al., 2023; Latner et al., 2019). Quigley (2022) discusses the usefulness of neurobiological explanations for reducing stigma, but highlights the importance of not oversimplifying these explanations and ensuring that both the genetic and environmental factors are discussed to avoid behavioral addictions, like gambling disorder, being judged as issues of morality. A video-based contact intervention had mixed effects on stigma towards people with gambling problems (Brown & Russell, 2019), but a theatre performance was effective in improving attitudes (Thomas et al., 2024). Comparatively, education interventions have been shown to reduce stigma towards problem gambling (Brown & Russell, 2019). Combining both education and contacted interventions has been recommended as a way of improving the benefits of intervention programs (Quigley, 2022).

5.3.1 *Advocacy*

Advocacy is a unique approach to addressing stigma by focusing more on educating about the stigma and discrimination towards a behavioral addiction rather than education about the condition itself (Corrigan et al., 2012). Advocacy approaches may be more appropriate for behavioral addictions than other mental illnesses. Advocacy frames the illness as a social justice issue and seeks to dispel myths about the illness (Brown & Russell, 2019). For example, Brown and Russell (2019) emphasized the role

of the government and gambling industry as a way of displacing blame from problem gamblers. Although Brown and Russell provide some preliminary evidence for the use of advocacy interventions for gambling disorder stigma, other research has reported no effect or increases in stigma towards other mental illnesses (Arboleda-Flórez & Stuart, 2012). However, in-person interventions are shown to be more effective at abating stigma than video interventions (Corrigan et al., 2012) which were used by Brown and Russell (2019).

5.4 Limitations of Stigma Research

There is limited academic literature on behavioral addiction stigma and, consequently, there are several limitations and gaps in our understanding. There is a paucity of studies in clinical populations that could assist in understanding self-stigma and the implications of experienced or perceived public stigma on the wellbeing of these clinical populations. Similarly, investigations of frequency of public stigma have not involved representative samples of target populations, and therefore these data may not be sufficiently generalizable to indicate prevalence. Another limitation has been the consistency of stigma measures across different conditions, focusing on a range of factors from endorsing negative stereotypes, having negative emotions, or behaving negatively towards people with a behavioral addiction, which could indicate a different range of outcomes and effects on people who experience behavioral addictions given the wide range in severity of stigma. Additionally, it is unclear whether self-reported perceptions of disorders are predictive of behaviors and how well the measures used maintain ecological validity when this research area depends predominantly on self-report measures that may be subject to social desirability and similar biases. In this way, the real world financial and health impact of reduced or delayed treatment due to stigma is unclear from the current research.

5.5 Future Directions

Further investigation into stigma in behavioral addictions can improve our understanding of emerging categories that are not well researched. For example, gambling disorder, food addiction, and technology-based addictions (i.e., gaming disorder, problem phone or social media use) are often investigated more than other behavioral addictions (e.g., compulsive shopping, pornography, or work addiction). Similarly, most research focuses on public stigma and research on other types of stigma (self, associated, or structural stigma) could provide direct insights into the lived experiences of people with behavioral addictions or the impact of institutional and policy decisions. Importantly, more consideration should be given to stigma intervention programs to minimize the negative impact of public stigma on wellbeing for people with a behavioral addiction. Consideration should also be given to self-stigma interventions that aim to increase treatment-seeking among people with behavioral addictions.

Future studies can increase understanding of the mechanisms causing familiarity, psychological distress and wellbeing, and neurobiological explanations of behavioral addictions to impact behavioral addiction stigma. Given the theories suggesting a possible U-shaped relationship between familiarity and stigma (Corrigan & Nieweglowski, 2019), the importance of contact being a positive interaction (Couture & Penn, 2003), and mixed effects of familiarity in the literature, future research should examine the nature of contact with people with behavioral addictions when studying contact-based interventions for stigma. This could include using measures that examine whether interactions with people with behavioral addictions were positive or negative, and testing whether these ratings influence the effect of familiarity on stigma. Similarly, research on neurobiological explanations could seek to identify what educational elements may be useful for reducing prejudice and discrimination.

6. CONCLUSIONS

Understanding stigma is fundamental to our understanding of the lived experiences of people with behavioral addictions and barriers to treatment-seeking. Studies have tended to focus on how much stigma behavioral addictions receive in relation to other disorders or resulting from diagnostic labels. Behavioral addictions can elicit stigmatizing attitudes like anger, pity, avoidance, shame, feelings of stupidity, or being seen as lazy and unpopular. Behavioral addiction stigma has been shown to be related to having less familiarity with people with the condition and with higher psychological distress. Neurobiological explanations of behavioral addictions are associated with reductions in stigma and diagnostic labels are associated with increases in stigma. Interventions seeking to reduce stigma towards behavioral addictions could involve education about the disorder and contact with people who have lived experience of a behavioral addiction. Stigma reduction strategies involve promoting the use of non-blaming language, person-centered practice, and engaging in anti-stigma training that involves people with lived experience of behavioral addictions. Future research could investigate the nature of self-stigma, and the effectiveness of stigma intervention programs, in the context of behavioral addictions.

REFERENCES

Aarseth, E., Bean, A. M., Boonen, H., Colder Carras, M., Coulson, M., Das, D., ... & Van Rooij, A. J. (2017). Scholars' open debate paper on the World Health Organization ICD-11 Gaming Disorder proposal. *Journal of Behavioral Addictions*, *6*(3), 267-270. https://doi.org/10.1556/2006.5.2016.088

Ahorsu, D. K., Lin, C. Y., Imani, V., Griffiths, M. D., Su, J. A., Latner, J. D., ... & Pakpour, A. H. (2020). A prospective study on the link between weight-related self-stigma and binge eating: Role of food addiction and psychological distress. *International Journal of Eating Disorders*, *53*(3), 442-450. https://doi.org/10.1002/eat.23219

Amir, Y. (1969). Contact hypothesis in ethnic relations. *Psychological Bulletin*, *71*(5), 319-342. https://doi.org/10.1037/h0027352

Andrà, C., Priolo, G., Merlin, F., & Chiavarino, C. (2022). Differences in perceived and experienced stigma between problematic gamblers and non-gamblers in a general population survey. *Journal of Gambling Studies*, *38*(2), 333-351. https://doi.org/10.1007/s10899-021-10048-9

Angermeyer, M. C., Holzinger, A., Carta, M. G., & Schomerus, G. (2011). Biogenetic explanations and public acceptance of mental illness: systematic review of population studies. *The British Journal of Psychiatry*, *199*(5), 367-372. https://doi.org/10.1192/bjp.bp.110.085563

Angermeyer, M. C., & Matschinger, H. (2003). The stigma of mental illness: Effects of labelling on public attitudes towards people with mental disorder. *Acta Psychiatrica Scandinavica*, *108*(4), 304-309. https://doi.org/10.1034/j.1600-0447.2003.00150.x

Arboleda-Flórez, J., & Stuart, H. (2012). From sin to science: Fighting the stigmatization of mental illnesses. *The Canadian Journal of Psychiatry*, *57*(8), 457-463. https://doi.org/10.1177/070674371205700803

Bannon, K. L., Hunter-Reel, D., Wilson, G. T., & Karlin, R. A. (2009). The effects of causal beliefs and binge eating on the stigmatization of obesity. *International Journal of Eating Disorders*, *42*(2), 118-124. https://doi.org/10.1002/eat.20588

Bergstrom, K., Fisher, S., & Jenson, J. (2016). Disavowing 'That Guy': Identity construction and massively multiplayer online game players. *Convergence (London, England)*, *22*(3), 233–249. https://doi.org/10.1177/1354856514560314

Bielenberg, J., Swisher, G., Lembke, A., & Haug, N. A. (2021). A systematic review of stigma interventions for providers who treat patients with substance use disorders. *Journal of Substance Abuse Treatment*, *131*, 108486. https://doi.org/10.1016/j.jsat.2021.108486

Blaszczynski, A., Swanton, T. B., & Gainsbury, S. M. (2020). Avoiding use of stigmatising descriptors in gambling studies. *International Gambling Studies*, *20*(3), 369–372. https://doi.org/10.1080/14459795.2020.1808774

Bonnaire, C., Liddle, H. A., Har, A., Nielsen, P., & Phan, O. (2019). Why and how to include parents in the treatment of adolescents presenting Internet gaming disorder? *Journal of Behavioral Addictions*, *8*(2), 201-212. https://doi.org/10.1556/2006.8.2019.27

Bos, A. E., Pryor, J. B., Reeder, G. D., & Stutterheim, S. E. (2013). Stigma: Advances in theory and research. *Basic and Applied Social Psychology*, *35*(1), 1-9. https://doi.org/10.1080/01973533.2012.746147

Brown, K. L., & Russell, A. M. (2019). Exploration of intervention strategies to reduce public stigma associated with gambling disorder. *Journal of Gambling Studies*, *36*(2), 713-733. https://doi.org/10.1007/s10899-019-09888-3

Casale, S., Boursier, V., Musicò, A., Ghinassi, S., Cigolini, G., Petrucci, E., & Gioia, F. (2023). Stigmatizing attitudes toward internet gaming disorder, problematic smartphone use and problematic social networking site use: An experimental vignette study. *Addictive Behaviors*, *141*, 107665. https://doi.org/10.1016/j.addbeh.2023.107665

Carroll, A., Rodgers, B., Davidson, T., & Sims, S. (2013). Stigma and help-seeking for gambling

problems. Canberra, Australia: Australian National University.

Chan, B. T., & Tsai, A. C. (2017). Personal contact with HIV-positive persons is associated with reduced HIV-related stigma: Cross-sectional analysis of general population surveys from 26 countries in sub-Saharan Africa. *African Journal of Reproduction and Gynaecological Endoscopy*, *20*(1), 21395. https://doi.org/10.7448/IAS.20.1.21395

Chang, C. W., Chen, J. S., Huang, S. W., Potenza, M. N., Su, J. A., Chang, K. C., ... & Lin, C. Y. (2023). Problematic smartphone use and two types of problematic use of the internet and self-stigma among people with substance use disorders. *Addictive Behaviors*, 147, 107807. https://doi.org/10.1016/j.addbeh.2023.107807

Corrigan, P. W. (2000). Mental health stigma as social attribution: Implications for research methods and attitude change. *Clinical Psychology: Science and Practice*, *7*(1), 48–67. https://doi.org/10.1093/clipsy/7.1.48

Corrigan, P. W., Larson, J. E., & Ruesch, N. (2009). Self-stigma and the "why try" effect: Impact on life goals and evidence-based practices. *World Psychiatry*, *8*(2), 75-81. https://doi.org/10.1002/j.2051-5545.2009.tb00218.x

Corrigan, P., Markowitz, F. E., Watson, A., Rowan, D., & Kubiak, M. A. (2003). An attribution model of public discrimination towards persons with mental illness. *Journal of Health and Social Behavior*, *44*(2), 162–179. https://doi.org/10.2307/1519806

Corrigan, P. W., & Nieweglowski, K. (2019). How does familiarity impact the stigma of mental illness? *Clinical Psychology Review*, *70*, 40-50. https://doi.org/10.1016/j.cpr.2019.02.001

Corrigan, P., Thompson, V., Lambert, D., Sangster, Y., Noel, J. G., & Campbell, J. (2003). Perceptions of discrimination among persons with serious mental illness. *Psychiatric Services*, *54*(8), 1105-1110. https://doi.org/10.1176/appi.ps.54.8.1105

Corrigan, P. W., Morris, S. B., Michaels, P. J., Rafacz, J. D., & Rüsch, N. (2012). Challenging the public stigma of mental illness: A meta-analysis of outcome studies. *Psychiatric Services*, *63*(10), 963-973. https://doi.org/10.1176/appi.ps.201100529

Couture, S., & Penn, D. (2003). Interpersonal contact and the stigma of mental illness: A review of the literature. *Journal of Mental Health*, *12*(3), 291-305. https://doi.org/10.1080/0963823100011827 6

Cunningham, R., Imlach, F., Lockett, H., Lacey, C., Haitana, T., Every-Palmer, S., ... & Peterson, D. (2023). Do patients with mental health and substance use conditions experience discrimination and diagnostic overshadowing in primary care in Aotearoa New Zealand? Results from a national online survey. *Journal of Primary Health Care*, *15*(2), 112-121. https://doi.org/10.1071/HC23015

DePierre, J. A., Puhl, R. M., & Luedicke, J. (2013). A new stigmatized identity? Comparisons of a "food addict" label with other stigmatized health conditions. *Basic and Applied Social Psychology*, *35*(1), 10-21. https://doi.org/10.1080/01973533.2012.746148

Dovidio, J. F., Gaertner, S. L., & Kawakami, K. (2003). Intergroup contact: The past, present, and the future. *Group Processes & Intergroup Relations*, *6*(1), 5-21. https://doi.org/10.1177/1368430203006001009

Dullur, P., & Hay, P. (2017). Problem internet use and internet gaming disorder: A survey of health literacy among psychiatrists from Australia and New Zealand. *Australasian Psychiatry*, *25*(2), 140-145. https://doi.org/10.1177/1039856216684714

Elflein, J. (2021, August). *Beliefs of adults over 40 years about societal stigma of health conditions U.S. 2021*. Statista. https://www.statista.com/statistics/1255170/beliefs-about-stigma-of-conditions-adults-40-plus-us/

Ertl, V., Groß, M., Mwaka, S. O., & Neuner, F. (2021). Treating alcohol use disorder in the absence of specialized services–evaluation of the moving inpatient Treatment Camp approach in Uganda. *BMC Psychiatry*, *21*(1), 1-17. https://doi.org/10.1186/s12888-021-03593-5

Feldman, D. B., & Crandall, C. S. (2007). Dimensions of mental illness stigma: What about mental illness causes social rejection? *Journal*

of Social and Clinical Psychology, *26*(2), 137-154. https://doi.org/10.1521/jscp.2007.26.2.137

Ferguson, C. J., & Colwell, J. (2019). Lack of consensus among scholars on the issue of video game "addiction". *Psychology of Popular Media*, *9*(3), 359-366. https://doi.org/10.1037/ppm0000243

Fung, X. C., Siu, A. M., Potenza, M. N., O'Brien, K. S., Latner, J. D., Chen, C. Y., ... & Lin, C. Y. (2021). Problematic use of internet-related activities and perceived weight stigma in schoolchildren: A longitudinal study across different epidemic periods of COVID-19 in China. *Frontiers in Psychiatry*, *12*, 675839. https://doi.org/10.3389/fpsyt.2021.675839

Galanis, C. R., Delfabbro, P. H., & King, D. L. (2021). Stigma-related arguments against gaming disorder: A call for research. *Addiction, 116(10)*, 2921–2922. https://doi.org/10.1111/add.15561

Galanis, C. R., & King, D. L. (2025). Stigma and other public perceptions of recreational gaming and gaming disorder: A large-scale qualitative analysis. Computers in Human Behavior Reports, 17, 100581. https://doi.org/10.1016/j.chbr.2024.100581

Galanis, C.R., Leske, M., Hamamura, T., Weber, N., Hing, N., Delfabbro, P., & King, D. L. (2025). Stigma in substance-based and behavioral addictions: A systematic review. *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2024.00072

Galanis, C., Weber, N., Delfabbro, P. H., Billieux, J., & King, D. L. (2023). Gaming disorder and stigma-related judgements of gaming individuals: An online randomized controlled trial. *Addiction*, *118*(9), 1687-1698. https://doi.org/10.1111/add.16211

Healy, M., Richard, A., & Kidia, K. (2022). How to reduce stigma and bias in clinical communication: A narrative review. *Journal of General Internal Medicine*, *37*(10), 2533-2540. https://doi.org/10.1007/s11606-022-07609-y

Hemeida, S., & Goldberg, D. (2022). Dismantling structural addiction stigma in law: Policies for systematic change. *Families, Systems, & Health*, *40*(2), 288-290. https://doi.org/10.1037/fsh0000714

Himelein-Wachowiak, M., Giorgi, S., Kwarteng, A., Schriefer, D., Smitterberg, C., Yadeta, K., Bragard, E., Devoto, A., Ungar, L., & Curtis, B. (2022). Getting "clean" from nonsuicidal self-injury: Experiences of addiction on the subreddit r/selfharm. *Journal of Behavioral Addictions*, *11*(1), 128–139. https://doi.org/10.1556/2006.2022.00005

Hing, N., & Russell, A. M. (2017a). How anticipated and experienced stigma can contribute to self-stigma: The case of problem gambling. *Frontiers in psychology*, *8*, 235.

Hing, N., & Russell, A. M. (2017b). Psychological factors, sociodemographic characteristics, and coping mechanisms associated with the self-stigma of problem gambling. *Journal of Behavioral Addictions*, *6*(3), 416-424. https://doi.org/10.1556/2006.6.2017.056

Hing, N., Russell, A. M., Gainsbury, S. M., & Nuske, E. (2016). The public stigma of problem gambling: Its nature and relative intensity compared to other health conditions. *Journal of Gambling Studies*, *32*(3), 847-864. https://doi.org/10.1007/s10899-015-9580-8

Hing, N., Russell, A. M., & Gainsbury, S. M. (2016). Unpacking the public stigma of problem gambling: The process of stigma creation and predictors of social distancing. *Journal of Behavioral Addictions*, *5*(3), 448-456. https://doi.org/10.1556/2006.5.2016.057

Holmes, E. P., Corrigan, P. W., Williams, P., Canar, J., & Kubiak, M. A. (1999). Changing attitudes about schizophrenia. *Schizophrenia Bulletin*, *25*(3), 447-456.

Horch, J. D., & Hodgins, D. C. (2008). Public stigma of disordered gambling: Social distance, dangerousness, and familiarity. *Journal of Social and Clinical Psychology*, *27*(5), 505-528. https://doi.org/10.1521/jscp.2008.27.5.505

Horch, J. D., & Hodgins, D. C. (2015). Self-stigma coping and treatment-seeking in problem gambling. *International Gambling Studies*, *15*(3), 470-488. https://doi.org/10.1080/14459795.2015.1078392

Karlsson, A., Hakansson, A., & Hansson-Nylund, H. (2023). Personal experiences of suicidality in women with gambling disorder – A qualitative interview study. *Journal of Behav-*

ioral Addictions, *12*(2), 510–521. https://doi.org/10.1556/2006.2023.00024

Kilian, C., Manthey, J., Carr, S., Hanschmidt, F., Rehm, J., Speerforck, S., & Schomerus, G. (2021). Stigmatization of people with alcohol use disorders: An updated systematic review of population studies. *Alcoholism: Clinical and Experimental Research*, *45*(5), 899-911. https://doi.org/10.1111/acer.14598

Klein, V., Briken, P., Schröder, J., & Fuss, J. (2019). Mental health professionals' pathologization of compulsive sexual behavior: Does clients' gender and sexual orientation matter? *Journal of Abnormal Psychology*, *128*(5), 465-472. http://dx.doi.org/10.1037/abn0000437

Konkolÿ Thege, B. K., Colman, I., el-Guebaly, N., Hodgins, D. C., Patten, S. B., Schopflocher, D., ... & Wild, T. C. (2015). Social judgments of behavioral versus substance-related addictions: A population-based study. *Addictive Behaviors*, 42, 24-31. https://doi.org/10.1016/j.addbeh.2014.10.025

Kowert, R., Festl, R., & Quandt, T. (2014). Unpopular, overweight, and socially inept: Reconsidering the stereotype of online gamers. *Cyberpsychology, Behavior, and Social Networking*, *17*(3), 141-146. https://doi.org/10.1089/cyber.2013.0118

Kowert, R., Griffiths, M. D., & Oldmeadow, J. A. (2012). Geek or chic? Emerging stereotypes of online gamers. *Bulletin of Science, Technology & Society*, *32*(6), 471-479. https://doi.org/10.1177/0270467612469078

Kvaale, E. P., Gottdiener, W. H., & Haslam, N. (2013). Biogenetic explanations and stigma: A meta-analytic review of associations among laypeople. *Social Science & Medicine*, *96*, 95-103. https://doi.org/10.1016/j.socscimed.2013.07.017

Lang, B., & Rosenberg, H. (2017). Public perceptions of behavioral and substance addictions. *Psychology of Addictive Behaviors*, *31*(1), 79-84. http://dx.doi.org/10.1037/adb0000228

Latner, J. D., Puhl, R. M., Murakami, J. M., & O'Brien, K. S. (2014). Food addiction as a causal model of obesity. Effects on stigma, blame, and perceived psychopathology. *Appetite*, *77*, 79-84. https://doi.org/10.1016/j.appet.2014.03.004

Lebowitz, M. S., & Appelbaum, P. S. (2017). Beneficial and detrimental effects of genetic explanations for addiction. *International Journal of Social Psychiatry*, *63*(8), 717–723. https://doi.org/10.1177/0020764017737573

Lee, K. Y., Chen, C. Y., Chen, J. K., Liu, C. C., Chang, K. C., Fung, X. C., ... & Lin, C. Y. (2023). Exploring mediational roles for self-stigma in associations between types of problematic use of internet and psychological distress in youth with ADHD. *Research in Developmental Disabilities*, *133*, 104410. https://doi.org/10.1016/j.ridd.2022.104410

Li, A. Y. L., Chau, C. L., & Cheng, C. (2019). Development and validation of a parent-based program for preventing gaming disorder: The game over intervention. *International Journal of Environmental Research and Public Health*, *16*(11), 1984. https://doi.org/10.3390/ijerph16111984

Li, Q., & Whelan, J. P. (2024). Behavioral Addiction from the Asian Americans Perspective: Exploration of Public and Help-Seeking Stigma. *Journal of Gambling Studies*, *40*(1), 367–385. https://doi.org/10.1007/s10899-023-10210-5

Link, B. G., & Phelan, J. C. (2001). Conceptualizing stigma. *Annual Review of Sociology*, *27,* 363-385. https://doi.org/10.1146/annurev.soc.27.1.363

Link, B. G., Yang, L. H., Phelan, J. C., & Collins, P. Y. (2004). Measuring mental illness stigma. *Schizophrenia Bulletin*, *30*(3), 511-541. https://doi.org/10.1093/oxfordjournals.schbul.a007098

Link, B. G. (1987). Understanding labeling effects in the area of mental disorders: An assessment of the effects of expectations of rejection. *American Sociological Review*, *52*(1), 96-112. https://doi.org/10.2307/2095395

Loehr, A., Doan, L., & Miller, L. R. (2015). The role of selection effects in the contact hypothesis: Results from a US national survey on sexual prejudice. *Archives of Sexual Behavior*, (8), 2111-2123. https://doi.org/10.1007/s10508-015-0483-7

Loughman, A., & Haslam, N. (2018). Neuroscientific explanations and the stigma of mental disorder: a meta-analytic study. *Cognitive Research: Principles and Implications, 3*(1). https://doi.org/10.1186/s41235-018-0136-1

Mak, W. W., & Cheung, R. Y. (2010). Self-stigma among concealable minorities in Hong Kong: conceptualization and unified measurement. *American Journal of Orthopsychiatry*, *80*(2), 267-281. https://doi.org/10.1111/j.1939-0025.2010.01030.x

Maunder, R. D., & White, F. A. (2019). Intergroup contact and mental health stigma: A comparative effectiveness meta-analysis. *Clinical Psychology Review*, *72*, 101749. https://doi.org/10.1016/j.cpr.2019.101749

Miller, H., & Thomas, S. (2018). The problem with 'responsible gambling': Impact of government and industry discourses on feelings of felt and enacted stigma in people who experience problems with gambling. *Addiction Research & Theory*, *26*(2), 85-94. https://doi.org/10.1080/16066359.2017.1332182

O'Connor, C., Brassil, M., O'Sullivan, S., Seery, C., & Nearchou, F. (2022). How does diagnostic labelling affect social responses to people with mental illness? A systematic review of experimental studies using vignette-based designs. *Journal of Mental Health*, *31,* 115-130. https://doi.org/10.1080/09638237.2021.1922653

Ottati, V., Bodenhausen, G. V., & Newman, L. S. (2005). Social Psychological Models of Mental Illness Stigma. In P. W. Corrigan (Ed.) (2005). *On the stigma of mental illness: Practical strategies for research and social change* (pp. 99-128). Washington, DC: American Psychological Association.

Overton, S. L., & Medina, S. L. (2008). The stigma of mental illness. *Journal of Counseling & Development*, *86*(2), 143-151. https://doi.org/10.1002/j.1556-6678.2008.tb00491.x

Peter, S. C., Li, Q., Pfund, R. A., Whelan, J. P., & Meyers, A. W. (2019). Public stigma across addictive behaviors: Casino gambling, eSports gambling, and Internet gaming. *Journal of Gambling Studies*, *35*(1), 247-259. https://doi.org/10.1007/s10899-018-9775-x

Pfitzner, K., & Kapitány-Fövény, M. (2018). Stigma of substance use in healthcare: A research on contact hypothesis. *Developments in Health Sciences*, *1*(2), 44-48. https://doi.org/10.1556/2066.2.2018.14

Quigley, L. (2022). Gambling disorder and stigma: opportunities for treatment and prevention. *Current Addiction Reports*, *9*(4), 410-419. https://doi.org/10.1007/s40429-022-00437-4

Quigley, L., Prentice, J., Warren, J. T., Quilty, L. C., Dobson, K. S., & Hodgins, D. C. (2020). What's in a name? Evaluating the public stigma of gambling disorder. *Journal of Gambling Studies*, *36*(4), 1205-1228. https://doi.org/10.1007/s10899-019-09924-2

Riordan, B. C., Winter, D. T., Barrett, L. Ritter, A., Lancaster., Seear, K., Butler, K., & Haber, P. S. (2021). Guidelines for the treatment of alcohol problems: An introduction. In P. S. Haber, & B. C. Riordan (Eds.), *New Australian guidelines for the treatment of alcohol problems: an overview of recommendations* (pp. S3-S5). Medical Journal of Australia.

Rolando, S., Ferrari, C., & Beccaria, F. (2023). "To me, it was Just a Vice". Stigma and Other Barriers to Gambling Treatment in Piedmont, Italy. *Journal of Gambling Studies*, *39*(4), 1909-1925. https://doi.org/10.1007/s10899-023-10214-1

Ruddock, H. K., Orwin, M., Boyland, E. J., Evans, E. H., & Hardman, C. A. (2019). Obesity stigma: Is the 'food addiction' label feeding the problem? *Nutrients*, *11*(9), 2100. https://doi.org/10.3390/nu11092100

Sharma, T., Bamford, M., & Dodman, D. (2015). Person-centred care: An overview of reviews. *Contemporary Nurse*, *51*(2-3), 107-120. https://doi.org/10.1080/10376178.2016.1150192

Teachman, B. A., Wilson, J. G., & Komarovskaya, I. (2006). Implicit and explicit stigma of mental illness in diagnosed and healthy samples. *Journal of Social and Clinical Psychology*, *25*(1), 75-95. https://doi.org/10.1521/jscp.2006.25.1.75

Thomas, A. C., Portogallo, H., Read, F., Avisar, J., Merkouris, S. S., & Dowling, N. A. (2023). Lived experience performance to reduce stig-

ma, enhance understanding of gambling harm and change attitudes and behaviours of professionals and community members. *Journal of Gambling Studies*, *40*(2), 749–774. https://doi.org/10.1007/s10899-023-10223-0

Van Rooij, A. J., Ferguson, C. J., Colder Carras, M., Kardefelt-Winther, D., Shi, J., Aarseth, E., ... & Przybylski, A. K. (2018). A weak scientific basis for gaming disorder: Let us err on the side of caution. *Journal of Behavioral Addictions*, *7*(1), 1-9. https://doi.org/10.1556/2006.7.2018.19

Visentin, L. (2022, November 1). *'Gamble responsible' message ditched from betting ads*. The Sydney Morning Herald. https://www.smh.com.au/politics/federal/gamble-responsibly-message-ditched-from-betting-ads-20221101-p5buqg.html

Weiss, M. G., Ramakrishna, J., & Somma, D. (2006). Health-related stigma: Rethinking concepts and interventions. *Psychology, Health & Medicine*, *11*(3), 277-287. https://doi.org/10.2466/pro.1986.58.1.11

Wu, L. T., Blazer, D. G., Li, T. K., & Woody, G. E. (2011). Treatment use and barriers among adolescents with prescription opioid use disorders. *Addictive Behaviors*, *36*(12), 1233-1239. https://doi.org/10.1016/j.addbeh.2011.07.033

Yang, L. H., Kleinman, A., Link, B. G., Phelan, J. C., Lee, S., & Good, B. (2007). Culture and stigma: Adding moral experience to stigma theory. *Social Science & Medicine*, *64*(7), 1524-1535. https://doi.org/10.1016/j.socscimed.2006.11.013

13

NAVIGATING THE SHADOWS: ADDRESSING AND MITIGATING THE PERVASIVENESS OF ANTISOCIAL BEHAVIOURS IN THE DIGITAL AGE

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ABSTRACT:

Although there is still ongoing debate about what is problematic internet use, addiction or pathologizing everyday life, it is widely acknowledged that the spread of social media and ICTs has impacted social dynamics. While technology has many advantages, it can also be used to abuse others, become an extension to offline violence, and come up with new ways to target others. Online bullying is one of the most common types of violence young people endure online, but antisocial *cyberbehaviour* comes in many shapes and is not restricted to the younger generations either. Unfortunately, social media platforms are commonly used for harassment, hate speech, the spread of misinformation, and Far-Right radicalisation. The Dark Web is often associated with illegal activities such as organ or human trafficking and the distribution of child sexual abuse material. Instant messaging allows individuals to be mean to someone remotely and spread rumours or embarrassing pictures about them to a wider audience. The truth is that none of these are novel issues, but are carried out easily, immediately, anywhere and at any time, as long as there is connectivity and sufficient know-how. One could even argue that the use of generative AI is a mere refinement of cutting and pasting one image over another. However, wondering whether the behaviour or the setting is novel does not diminish the pervasiveness and impact that any kind of antisocial behaviour can have. The negative consequences not only for targets but for all individuals involved in violence make it crucial to promote digital citizenship and online safety skills. Such skills would help young people and trusted adults to keep themselves and others safe online. In addition, individuals will have a greater capacity to respond to antisocial online behaviour and potentially reduce any harm. Schools can be an ideal environment to provide this type of training, provided that educators have access to suitable and effective evidence-based programmes, resources, and training themselves. The present chapter will also discuss further recommendations to tackle antisocial online behaviour such as the importance to consider the contributions of other key agents, such as policymakers, social media providers, and the wider community.

KEYWORDS:

cyberbehaviour, online safety, antisocial behaviour, prevention, digital citizenship, whole education approach

1. INTRODUCTION

Internet access has been steadily increasing over the last decades, and the COVID-19 pandemic has served as a catalyst for digital transformation across various sectors, accelerating trends that were already underway and normalising all kinds of online interactions. This omnipresence of Information and Communication Technologies [ICT] in everyday life makes it crucial to understand and address online bullying and antisocial online behaviour for creating a safer, more inclusive online environment for everyone.

Online bullying can have severe consequences on the mental health and wellbeing of individuals, especially young people. It can lead to anxiety, depression, and even suicidal thoughts and behaviours (Bansal et al., 2024; Quintana-Orts et al., 2022). Engaging in a number of antisocial behaviours online may have implications not only for the person doing it, but for others as well (Carbonell & Montiel, 2016). Addressing these issues requires promoting digital citizenship or resilience and responsible online behaviours (Jones & Mitchell, 2016). Educational programmes about the consequences of online bullying are limited in their success but can help foster a culture of empathy and understanding in digital spaces, resulting in a healthier online community where people feel safe to express themselves without fear of harassment or intimidation (Gaffney et al., 2019; Moreno et al., 2013). However, as our lives become increasingly digital, there's a growing need for legal and ethical frameworks to address online harassment and bullying. The need for the development of policies and laws that protect individuals from online harm cannot be disregarded either.

The present chapter will explore types of online antisocial behaviour, their impact, strategies for promoting digital citizenship, and recommendations to tackle antisocial cyber behaviour, such as the importance to consider the contributions of other key agents, such as policymakers, social media providers, and the wider community.

2. THE ROLE OF SOCIAL MEDIA AND ICTS

While there are challenges to address, the positive impacts of social media and ICTs are profound and far-reaching, and have been greatly proven during the COVID-19 lockdown when social media allowed people to remain connected despite the lockdown (Sun et al., 2022), and ICTs showed its potential for crisis response in addition to priorly well-known benefits.

Social media and ICTs create instant communication across the globe, allowing people to stay connected with family, friends, and colleagues regardless of geographic distance or even the impossibility to meet due to the lockdown. The internet provides unprecedented access to information and educational resources, with people having the chance to develop new skills, stay abreast of current events, and learn about a vast array of topics in an uncanny display of democratisation of knowledge. Social media platforms can be powerful tools for social activism and advocacy by amplifying voices, mobilising communities, and raising awareness about issues such as climate change, human rights, and social justice. People can share their art, music, writing, anything and everything with a global audience. Online communities and support groups foster belonging and support for individuals with shared interests or challenges. Social media also empower individuals by providing tools and platforms to express themselves, share their stories, and engage in civic activities. The internet also promotes cultural exchange and understanding by allowing people to share their cultures, traditions, and perspectives, all of which fosters global awareness and appreciation of diversity. While technology has many advantages, it can also be misused, causing harm to oneself or used to abuse others, whether because it becomes a new setting for traditional issues, or because it allows for new types of risks.

The development of a problematic or addictive use of the internet itself or even an addiction to ICTs in general has been discussed extensively in the literature, and elsewhere in the present handbook. The debate and the controversy it has generated was such that it has been dramatically but accurately described as a "Conceptual Minefield" by Ryding and Kaye (2018), and some authors do not consider it should be addressed as an addiction at all (Selwyn, & Aagaard, 2021). Internet or online "addiction" is not included in the reference diagnostic manuals, not in the DSM-5 published by the American Psychiatric Association (APA, 2013) nor in the ICD-11 of the World Health Organization (WHO, 2019a). Thus, "problematic internet use" has been proposed as better term to describe the inability to control the use oneself makes of cyberspace, generating discomfort from abstinence and negative repercussions in everyday life, but there are many other labels to describe this problematic being used in the literature, like "pathological use", "excessive use", or "compulsive use" (Feijóo, 2022). There is an even bigger controversy to define what such problematic use entails and avoid over-pathologizing everyday-life behaviour (Brand et al., 2020). Another reason why the concept of internet addiction remains contested is that individuals do not become addicted to the internet itself, but to the specific activities they engage in online (European Parliamentary Research Service, 2019) and therefore studying or treating it as a sole entity would be reductionistic.

3. UNDERSTANDING ANTI-SOCIAL CYBER BEHAVIOUR

Despite the abovementioned ongoing debate about what is problematic internet use, addiction or pathologizing everyday life, it is widely acknowledged that the spread of social media and ICTs has impacted social dynamics (Ma, 2011). Online bullying may be one of the most common types of peer violence young people endure online (Pichel et al., 2021), but antisocial cyberbehaviour comes in many shapes and is not restricted to the younger generation either. It is known that social media platforms are utilised for harassment, hate speech, the spread of misinformation, and Far-Right radicalisation. For example, online bullying can be accomplished by using instant messaging to be mean to someone remotely and spread rumours or embarrassing pictures about them to a wide audience. The Dark web is often associated with illegal activities such as organ or human trafficking and the distribution of child pornography. The truth is that none of these are novel issues but carried out easily, immediately, anywhere and at any time, as long as there is connectivity and sufficient know-how.

Antisocial online behaviours are those that intentionally or unintentionally put oneself or others at risk of harm online and may even constitute criminal acts. Some examples that have been raised by early literature include pornographic or violent media consumption, online bullying, cheating others, or carrying out different illegal activities (Ma, 2011). Online bullying has been covered in a prior chapter, but this chapter will expand on other types of antisocial behaviour, including online harassment, trolling, hate speech, doxing, and technology-facilitated sexual violence [TFSV].

A conceptual debate around online bullying that could rival the previously mentioned problematic internet use makes it more challenging to distinguish between online bullying and online harassment (Englander et al., 2017). Both phenomena involve deliberate actions intended to harm, distress, or upset the target, involve similar abusive behaviours, and can have significant effects on those involved. However, online bullying typically occurs in the context of existing relationships and tends to be a repeated behaviour, while online harassment may refer to one-off situations mostly between strangers (Englander et al., 2017). In some cases, both are used as umbrella terms and employed interchangeably to refer to the broad set of behaviours of victimisation through electronic means (Slaughter & Newman, 2022).

On the other hand, a very specific type of online victimisation is doxxing or doxing. Doxing represents the severe breach of privacy by publicly revealing personal information about an individual without their consent, typically with malicious intent (Chia et al., 2023). The information revealed usually refers to identifiable details, such as home address or private contact details, as well as a specific privacy breach related to disclosing someone's sexual orientation or gender identity, known as Outing (Brandon-Friedman, 2021). Both can lead to significant emotional, psychological, and sometimes physical harm to the target (Schoenebeck et al., 2023). However, Outing is particularly harmful in contexts where some sexual or gender identities are stigmatised or someone has

chosen to not openly express their identity. Outing can intersect or facilitate targeted violence and hate speech.

Hate speech undermines the dignity and sense of security of target groups, contributing to a social environment of fear and exclusion, even when outside of the online setting (Dreißigacker et al., 2024). Any public communication that belittles, threatens, or discriminates against a specific group of people who share a common property, such as their religion, ethnicity, gender, sexual orientation, or disability may constitute Hate speech (Castaño-Pulgarín et al., 2021). Another similar behaviour that does not target particular collectives is 'trolling', which encompasses deliberately posting provocative, off-topic, or inflammatory messages in an online community to elicit emotional responses or disrupt the ongoing dynamic. Perpetrators are referred to as "trolls" and often seek to create discord and conflict for their own amusement, but they may also have a political or ideological agenda to attempt to manipulate others opinion by spreading rumours, speculation and false information purposely, which is known as spreading disinformation (Llewellyn et al., 2019). Disinformation is spread with the intent to deceive and manipulate, and fake news are content mimicking legitimate news specifically fabricated to mislead others (Aïmeur et al., 2023). Whereas misinformation is incorrect information or even fake content shared unintentionally (Aïmeur et al., 2023), as individuals may find it difficult to identify fake content online, and people are prone to share and forward thought social media without questioning the trustworthiness of the information (Dumitru, 2020).

Fringe online communities tend to promote users' freedom of expression, making it unlikely that hate speech, fake content and trolling may be removed by moderators or platform operators (Rieger et al., 2021), and in turn becoming better outlets for such content than other media networks. Furthermore, harmful or hateful content is usually portrayed as humorous or "just a joke", which can make it harder to recognise and be perceived as less harmful, and memes have a great potential for creating media discourses (Andreasen, 2021). The use of humour and domain-specific slang can lead to hate speech playing a crucial role in strengthening bonds among members of the community and distinguishing members from clueless outsiders (Rieger et al., 2021; Tuters & Hagen, 2020), resulting on vitriolic content turning into a community-building tool for some people. Plus, exposure to prejudiced content leads other users to post more prejudiced comments themselves (Hsueh et al., 2015), as they may be conforming to the perceived group norms (Rieger et al., 2021). It should also be taken into account that even if hateful content is removed from the original source, it may be reposted somewhere else.

The widespread use of technology and its increasing capabilities, such as altering pictures and videos, allows a range of possibilities where behaviours of TFSV can occur (Kowalski & Thompson, 2024). TFSV has been used in recent years as umbrella term to specifically refer to unwelcome, offensive and harmful behaviour motivated by someone's gender and/or sexual orientation, but also unwelcome attitudes and

behaviours conveying sexual intent or desire (Gámez-Guadix et al., 2023). Behaviours of TFSV include electronically sending nude images or messages without consent; forcing someone to share explicit photos of themselves when they didn't want to; threatening to share or actually sharing electronically sexually explicit images that another person did not want shared; and posting sexual comments on another person's social media when they did not want them to (Ehman & Gross, 2022). Prevalence of TFSV is moderate to high across studies. Powell and Henry (2019) found that, across all types of TFSV examined, 62% of respondents reported having experienced at least one type of TFSV in their lifetime. Additionally, respondents aged 18 to 24 were the most likely to experience digital harassment and abuse, including cyber sexual violence, with 72% indicating they had experienced at least one form of TFSV. Previous research has found that TFSV experiences are associated with negative psychological and physical impacts (e.g., Eaton et al., 2017; Gassó et al., 2020; McGinley et al., 2016; Mitchell et al., 2016).

The above is a set of examples of cyberantisocial behaviours, but others could also be included. Antisocial behaviour refers to actions that violate societal norms and disregard others' rights (Ma, 2011). As such, the Dark Web can serve as the perfect outlet to conduct numerous forms of antisocial behaviour online as it is a part of the internet intentionally hidden and not accessible through standard web browsers or search engines, enabling various illicit activities through the anonymity it provides (Gupta et al., 2021). However, it should not be overlooked that mainstream publicly available platforms can give as easy access to varying types of illicit and harmful content online (Oksanen et al., 2021).

4. IMPLICATIONS AND IMPACT

Everyone is susceptible to online harm and antisocial behaviour, but the psychological resilience and coping mechanisms often differ with age, making the impact of online harm more profound and long-lasting for younger individuals (Singh et al., 2021). Furthermore, the rise in mental health needs is exacerbated, in addition to socioeconomic and individual factors, by exposure and higher usage of social media (WHO, 2019b), as a more intensive use and involvement in risky behaviour online is associated with further online harms (Feijóo et al., 2021).

Young people engage in online anti-social behaviour for fun and social approval and a reduced empathy towards targets, most likely showcasing that perpetrators are not aware of the harm they are causing (Soares et al., 2023). The absence of facial expressions and other interpersonal communication cues may cause antisocial behaviour to appear less hurtful or damaging in an online setting (Rieger et al., 2021). There also seems to be a pattern or normalisation or even vicarious learning (Bandura, 1978), as exposure to antisocial online content can trigger aggressive behaviour such as trolling others (Santos et al., 2023). Prior online experiences can shape the behaviour of young

people and their involvement in antisocial behaviour themselves, but it should be noted that prosocial exchanges seem to have more long-term impacts than antisocial behaviour (Erreygers et al., 2017). It has been found that being on the receiving end of a prosocial behaviour has a higher likelihood of causing a spiral of positive behaviours towards others (Erreygers et al., 2017). This may be due to negative experiences being considered a default of online interactions (Liu & Agur, 2023), while when prosocial behaviour is experienced, it has an even greater effect as a role model to be replicated.

Despite the normalisation of negative experiences online, research has highlighted that experiencing harms like online abuse and sexualised threats can result in victims withdrawing from social interaction, including with friends and family, employment and educational entities (Pashang et al., 2019; Storry & Poppleton, 2022). Moreover, individuals who experienced TFSV report higher levels of depression, anxiety, lower self-esteem, higher levels of stress, greater Post-traumatic stress disorder (PTSD), higher levels of delinquency, greater marijuana use and alcohol consumption, emotion dysregulation, and even loss of employment compared to those who did not experience TFSV (Cripps & Stermac, 2018; Smith et al., 2018; Mitchell et al., 2011; Citron & Franks, 2014).

This negative impact holds true for other examples of antisocial behaviour, with different types of victimisation online associated with a wide range of mental health impacts and decreased wellbeing in children and adolescents (Fulantelli et al., 2022). Moreover, research such as Ong et al. (2021) have warned that being bullied represents the main cause associated with suicide attempts during childhood. However, despite the social concern this kind of finding causes and while much of the discussion around online harm focuses on its targets, it is crucial to recognize that the repercussions extend beyond those directly victimised. Perpetrators of online antisocial behaviour can suffer long-term consequences beyond the obvious legal repercussions when their behaviour constitutes an offence, even if their behaviour is not violent, as is the case of gambling (Rial et al., 2023). Perpetrators have even been found to have similar mental health and wellbeing issues as those reported by targets (Fulantelli et al., 2022), and it is noteworthy that the worst outcomes are observed in those who have a double role as both targets and perpetrators of violence (Pichel et al., 2021). Moreover, those who witness antisocial behaviour and online harm are also impacted by them (Santos et al., 2023). Some individual users or even whole collectives may avoid or change their self-representation in digital spaces that have been deemed "unsafe" or hostile towards them (AlMuhanna et al., 2023). To the contrary, prosocial behaviour online increases the wellbeing of those involved, or as Tandoc Jr et al. (2023) summarises, "doing good for others online also does something good for the individual". Therefore, addressing online safety should not be just about protecting victims but also about understanding and mitigating the broader impacts on all people involved, fostering a healthier digital environment for everyone.

5. PREVENTION AND INTERVENTION

When trying to prevent or intervene in online harm and antisocial behaviour, a comprehensive or holistic approach to online safety is paramount. On one hand, there is a complex interplay of influences in young peoples' lives. Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979) offers a valuable framework for understanding and addressing these influences. Friends, families and all professionals engaged in youth education and wellbeing are key components of young peoples' microsystems, as they interact with them directly and impact their development through daily interactions. The relationships between parents, teachers, and other professionals reflect the mesosystem, where different members of the microsystem interact. Professionals, such as counsellors or social workers, might operate in the exosystem as well, while broader cultural values and societal norms are part of the macrosystem and influence the behaviours and expectations within the microsystems and mesosystems. Finally, the relevance of the Chronosystem (i.e. the influence of the passing of time and environmental events) has been recently illustrated by the behavioural impact of the COVID-19 lockdown (UNICEF, 2020). By examining the various systems that surround a young person, we can develop strategies that target each layer of influence (Gaffney et al., 2021), fostering a safer online environment. Online safety is not the responsibility of a single entity, but rather a collective effort involving all agents in a young person's ecosystem, from their immediate family and peer relationships to the broader social and cultural contexts.

On the other hand, focusing on specific online behaviours would not be as effective as when people are involved in antisocial or risky behaviour online it seldom is on only one (Beltrán-Catalán et al., 2018; Feijóo et al., 2021). In this sense, the development of a broad set of key skills and knowledge that young people and adults need to stay safe online is crucial, and promoting Digital Citizenship and Online Safety in general have been defined as priorities for European citizens of all ages (European Commission, 2019). Activities to promote these skills (e.g., knowing how to present oneself online and interact with others in a respectful way, or being able to configure privacy settings to share content selectively) should be one of the preventive efforts towards improving young peoples' microsystems.

Digital citizenship is understood as safe and responsible behaviour online, not only for oneself but also acting responsibly and respectfully towards other people (Jones & Mitchell, 2016). The Digital Competence framework for EU Citizens (European Commission, 2019) is defined as "confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society", and includes information, media and data literacy; communication and collaboration; digital content creation including programming; safety including competences related to cybersecurity; intellectual property related questions; as well as problem solving and critical thinking. Digital citizenship and its related skills would help young people and trusted adults to keep themselves and others safe online, as well as having a greater capacity to respond when some kind of violence or antisocial behaviour already took

place and reduce the harm. In addition, the replication of gender roles according to which females tend to be victimised more while males exercise a greater agency on their engagement in risky behaviour and harm others to a greater extent, highlights the need to also promote gender equality and consent values, as well as sexual ethics and healthy relationships (Dobson & Ringrose, 2016; Feijóo, 2022).

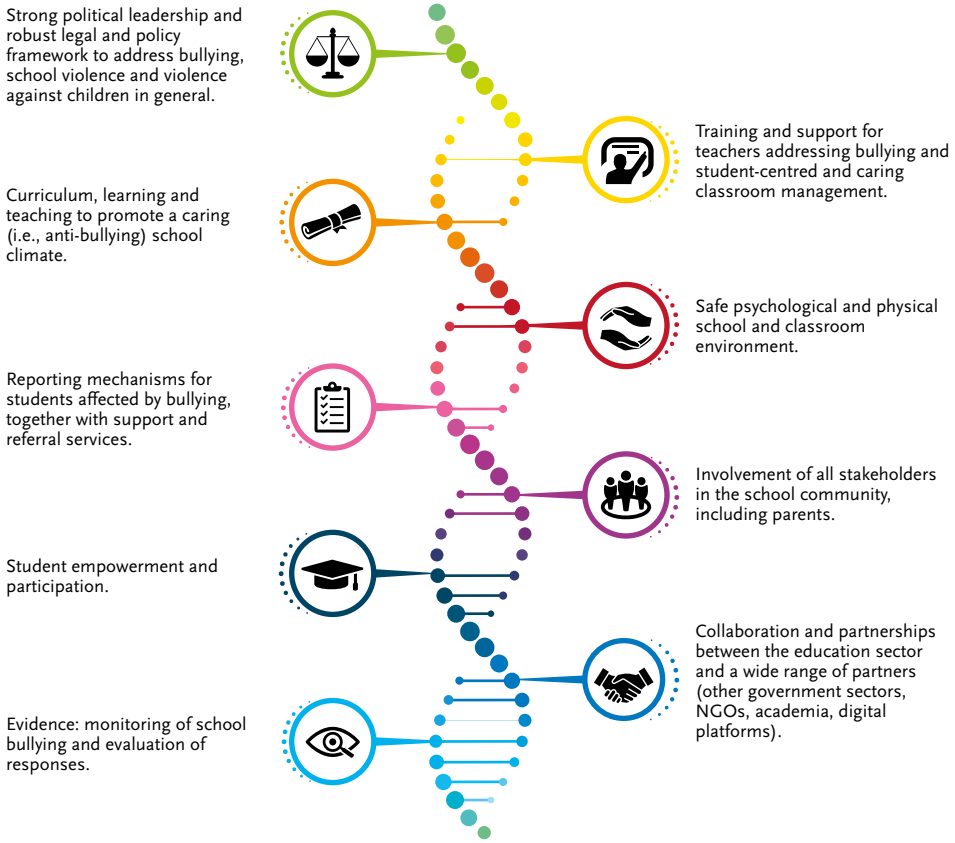
It should be noted that working with adolescents can be hard as they may believe that adults are trying to manipulate them and reduce their autonomy, so "wise interventions" are proposed to overcome reactance among children and young people. These "wise interventions" do not address risky behaviours directly, nor do they tell adolescents what to do explicitly, but they are designed to be respectful of the autonomy of adolescents, aiming to help them to enhance their interpretation of their environment, self-integrity and social belonging (Calvete et al., 2021). Despite young peoples' interest and developmental need to become more autonomous from adults, there is a relationship between lack of communication about online behaviour within the family and being victimised (Whittle et al., 2014). In this sense, parental mediation has been studied extensively as a protective factor against both suffering and causing online harm, and it has been found that a positive approach to supervision seems to be more efficient than a restrictive one (Feijóo, 2022). Parents and caregivers need to be encouraged to communicate with young people about their online involvement, monitor their use of internet and offer safety advice, all of which requires institutional support (Whittle et al., 2014), but they are still primarily responsible for the behaviour of their children online even on a legal basis (UNICEF, 2020). Additional preventive measures at the individual and family level that may appear obvious are that devices should have the latest software updates and antivirus programs, privacy settings set to "high", and it could be also useful to use "parental control" settings on the devices of younger children (UNICEF, 2020). It would be recommended to respect young people' developing autonomy as well as digital rights by including them in decisions affecting the devices they use (Lievens et al., 2018). Agreements can also be met so they would accept the new rules more willingly, increase their self-efficacy and overall wellbeing at the same time (Miller et al., 2017).

However, prevention or interventions merely based on providing information would not be sufficient. There are several emotional and social needs met online that would make risk taking and involvement in antisocial behaviour worth it for young people (Feijóo, 2022). Therefore, the promotion of empathy and understanding towards other people can help create healthier and safer online communities (Gaffney et al., 2019; Moreno et al., 2013), and make potential perpetrators become more aware of the negative impact of their actions (Rieger et al., 2021; Soares et al., 2023). Furthermore, any kind of intervention or prevention measures to be implemented should be evidence-based practices [EBP]. EBPs ensure that the strategies employed are backed by rigorous research, making them more likely to be effective and then evaluated to ensure they are having the desired impact (APA Presidential Task Force on Evidence-Based Practice,

2006; Kitson et al., 1998). Evidence-based programs can be tailored to address the different layers of a young person's environment (e.g. family, school, community, and online spaces), ensuring that prevention efforts are comprehensive in line with the ecological systems theory.

While schools can be ideal environments to provide training for young people and support to families, there has been a paradigm shift away from expecting schools to tackle issues and intervene on their own capacity towards a "whole-education approach" [WEA] (Cornu et al., 2022), according to which schools, the State, communities, organisations, social media companies, and governmental bodies share in their collective responsibility towards children and young people. A WEA approach differs from a whole-school approach in that it frames bullying (online and offline) behaviour, and related behaviours, not just within the local but also within the wider education and societal systems. The set of core components illustrated in Figure 1, operating simultaneously, have been identified as promoting a WEA to cyberbullying (O'Higgins Norman et al., 2022).

Figure 1. *UNESCO recommendations for a Whole Education Approach to tackle bullying (2020)*



The WEA is informed by the work of Bronfenbrenner (1979) who recognised that individual development and actions arise out of a complex system of influence and interaction between the individual, their context and the wider societal culture and systems. For example, the macrosystem (e.g., society at large) and chronosystem (e.g., environmental events) cannot be omitted either, and online behaviour should be monitored and prevention and intervention changed accordingly. The WEA recognises that proactive efforts from multiple stakeholders (e.g., parents, teachers, schools, practitioners and policy/lawmakers) are essential to establish preventive and intervention initiatives that address societal concerns as the digital landscape continues to evolve (Paat et al., 2021). Strong political leadership and policy play a significant role in making online environments, such as social media platforms, safer for adolescents. For example, the European Union has introduced the Digital Services Act (2024) which among other things regulates social media platforms to try to prevent illegal and harmful activities online and ensures user safety. However, much of the attention has so far focused on legislation and regulation to control social media and protect users, but there is a dearth of attention on the impact that digital literacy education makes on the quality of user experiences. The advent of Artificial Intelligence (AI) and recommender algorithms highlight the need to increase a sense of digital citizenship among users and to provide them with the knowledge and skills to participate safely and to act responsibly online.

6. CONCLUSIONS AND RESOURCES

Traditional preventive measures or interventions may become outdated or ineffective as the digital landscape continues to change and different manifestations of cyber antisocial behaviour and online harm appear. As such, it is important to continuously evaluate and adapt them to ensure they remain relevant and effective. EBP allows for this flexibility, as these programmes are grounded in research but are also subject to ongoing review and adjustment based on new findings. Effective prevention of antisocial behaviour and online harm requires input from various stakeholders to ensure that the interventions are well-rounded and address the needs of all parties involved, including victims, perpetrators, and bystanders. Therefore, there is a need for collaboration between researchers, practitioners, policymakers, and communities as a whole in developing and implementing these programs.

Most countries have resources openly available hosted by public agencies or designated organisation, such as the education hub on Digital citizenship (Ciudadanía Digital Mineduc) by the Spanish Department of Education, or Webwise, the Irish internet Safety Awareness Centre (co-funded by the European Commission) and is part of the Professional Development Service for Teachers, a Department of Education funded support service. Both offer courses for young people, their families and teachers, as well as all kinds of materials to support schools implementing their own initiatives,

families wanting to open the conversation or young people themselves looking to know more about specific topics, for example. Another source of up-to-date information on online behaviour in Spain is the website Pantallas Amigas (Friendly Screens). The above resources demonstrate how various stakeholders can collaborate on evidence-based information on online safety and digital citizenship, however, it is important that these groups continuously work together to update such resources and promote them to children and their families, as well as society in general.

REFERENCES

AlMuhanna, N., Hall, W., & Millard, D. E. (2023). Fear of the dark: a cross-cultural study into how perceptions of antisocial behaviour impact the acceptance and use of Twitter. *Behaviour & Information Technology, 42*(8), 1180–1193. https://doi.org/10.1080/0144929X.2022.2064766

Aïmeur, E., Amri, S., & Brassard, G. (2023). Fake news, disinformation and misinformation in social media: a review. *Social Network Analysis and Mining, 13*(1), 30. https://doi.org/10.1007/s13278-023-01028-5

American Psychiatric Association [APA] (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Arlington.

Andreasen, M. B. (2021). 'Rapeable' and 'unrapeable'women: the portrayal of sexual violence in Internet memes about# MeToo. *Journal of Gender Studies, 30*(1), 102–113. https://doi.org/10.1080/09589236.2020.1833185

APA Presidential Task Force on Evidence-Based Practice. (2006). Evidence-based practice in psychology. *The American Psychologist, 61*(4), 271–285. https://doi.org/10.1037/0003-066x.61.4.271

Bandura A. (1978). Social learning theory of aggression. *Journal of Communication, 28*(3), 12–29. https://doi.org/10.1111/j.1460-2466.1978.tb01621.x

Bansal, S., Garg, N., Singh, J., & Van Der Walt, F. (2024). Cyberbullying and mental health: past, present and future. *Frontiers in Psychology, 14*, Article 1279234. https://doi.org/10.3389%2Ffpsyg.2023.1279234

Beltrán Catalán, M., Zych, I., Ortega Ruiz, R., & Llorent García, V. J. (2018). Victimisation through bullying and cyberbullying: Emotional intelligence, severity of victimisation and technology use in different types of victims. *Psicothema*, *30*(2), 183–188. https://doi.org/10.7334/psicothema2017.313

Brand, M., Rumpf, H., Demetrovics, Z., Müller, A., Stark, R., King, D. L., Goudriaan, A. E., Mann, K., Trotzke, P., Fineberg, N. A., Chamberlain, S. R., Kraus, S. W., Wegmann, E., Billieux, J., & Potenza, M. N. (2022). Which conditions should be considered as disorders in the International Classification of Diseases (ICD-11) designation of "other specified disorders due to addictive behaviors"? *Journal of Behavioral Addictions, 11*(2), 150–159. https://doi.org/10.1556/2006.2020.00035

Brandon-Friedman, R. A. (2021). Outing. In H. Armstrong (Ed.), *Encyclopedia of sex and sexuality: Understanding biology, psychology, and culture, Volume 2* (pp. 467–469). ABC-CLIO.

Bronfenbrenner, U. (1979). *The ecology of human development*. Harvard University Press.

Calvete, E., Cortazar, N., Fernández-González, L., Echezarraga, A., Beranuy, M., León, A., González-Cabrera, J., & Orue, I. (2021). Effects of a brief preventive intervention in cyberbullying and grooming in adolescents. *Psychosocial Intervention, 30*(2), 75–84. https://doi.org/10.5093/pi2020a22

Carbonell, E. J., & Montiel, I. (2016). Vulnerabilidad y riesgo en los adolescentes: perfil del jugador de azar online [Vulnerability and risk in adolescents: profile of the online gambler]. In Echeburúa, E. (Coord.) *Abuso de Internet ¿Antesala para la adicción al juego de azar online?* Pirámide.

Castaño-Pulgarín, S. A., Suárez-Betancur, N., Vega, L. M. T., & López, H. M. H. (2021). Internet, social media and online hate speech. Systematic Review. *Aggression and Violent Behavior, 58*, Article 101608. https://doi.org/10.1016/j.avb.2021.101608

Chia, S. C., Sun, Y., Lu, F., & Gudmundsdottir, A. (2023). Doxing, regulation, and privacy protection: expanding the behavioral consequences of the third-person effect. *Asian Journal of Communication, 33*(3), 289–307. https://doi.org/10.1080/01292986.2023.2194883

Cornu, C., Abduvahobov, P., Laoufi, R., Liu, Y., & Séguy, S. (2022). An introduction to a whole-education approach to school bullying: Recommendations from UNESCO scientific committee on school violence and bullying including cyberbullying. *International Journal*

of Bullying Prevention, 5, 317–318. https://doi.org/10.1007/s42380-021-00093-8.

Dreißigacker, A., Müller, P., Isenhardt, A., & Schemmel, J. (2024). Online hate speech victimization: consequences for victims' feelings of insecurity. *Crime Science, 13*(1), Article 4. https://doi.org/10.1186/s40163-024-00204-y

Dobson, A. S., & Ringrose, J. (2016). Sext education: Pedagogies of sex, gender and shame in the schoolyards of tagged and exposed. *Sex Education, 16*(1), 8–21. https://doi.org/10.1080/14681811.2015.1050486.

Dumitru, E. A. (2020). Testing children and adolescents' ability to identify fake news: A combined design of quasi-experiment and group discussions. *Societies, 10*(3), Article 71. https://doi.org/10.3390/soc10030071

Ehman, A. C., & Gross, A. M. (2022). Keyboard coercion: Online and face-to-face sexual aggression in a college sample. *Journal of American College Health*. https://doi.org/10.1080/07448481.2022.2081509

Englander, E., Donnerstein, E., Kowalski, R., Lin, C. A., & Parti, K. (2017). Defining cyberbullying. *Pediatrics*, *140*, Article e20161758. https://doi.org/10.1542/peds.

European Commission (2019). *Key competences for lifelong learning*. European Commission, Directorate-General for Education, Youth, Sport and Culture, Key competences for lifelong learning, Publications Office. https://data.europa.eu/doi/10.2766/569540

European Commission (2024). *The Digital Services Act*. European Commission. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital-services-act_en

European Parliamentary Research Service [EPRS] (2019). *Harmful internet use. Part I: Internet addiction and problematic use*. EPRS. https://www.europarl.europa.eu/stoa/en/document/EPRS_STU(2019)624249

Feijóo, S. (2022). *Problematic Internet Use and online risk behaviors. An analysis from the gender perspective* [Doctoral dissertation]. Universidade de Santiago de Compostela. http://hdl.handle.net/10347/28872

Feijóo, S., Foody, M., O'Higgins Norman, J., Pichel, R., & Rial, A. (2021). Cyberbullies, the Cyberbullied, and Problematic Internet Use: Some Reasonable Similarities. *Psicothema, 33*(2), 198–205. https://doi.org/10.7334/psicothema2020.209

Fulantelli, G., Taibi, D., Scifo, L., Schwarze, V., & Eimler, S.C. (2022). Cyberbullying and Cyberhate as Two Interlinked Instances of Cyber-Aggression in Adolescence: A Systematic Review. *Frontiers in Psychology, 13*, Article 909299. https://doi.org/10.3389/fpsyg.2022.909299

Gaffney, H., Farrington, D. P., Espelage, D. L., & Ttofi, M. M. (2019). Are cyberbullying intervention and prevention programs effective? A systematic and meta-analytical review. *Aggression and Violent Behavior, 45*, 134 – 153. https://doi.org/10.1016/j.avb.2018.07.002

Gaffney, H., Ttofi, M. M., & Farrington, D. P. (2021). What works in anti-bullying programs? Analysis of effective intervention components. *Journal of School Psychology, 85*, 37–56. https://doi.org/10.1016/j.jsp.2020.12.002

Gámez-Guadix, M., Sorrel, M. A., & Martínez-Bacaicoa, J. (2023). Technology-facilitated sexual violence perpetration and victimization among adolescents: A network analysis. *Sexuality Research and Social Policy, 20*(3), 1000–1012. https://doi.org/10.1007/s13178-022-00775-y

Gupta, A., Maynard, S. B., & Ahmad, A. (2021). The dark web phenomenon: A review and research agenda. *arXiv preprint,* arXiv:2104.07138. https://doi.org/10.48550/arXiv.2104.07138

Jones, L. M., & Mitchell, K. J. (2016). Defining and measuring youth digital citizenship. *New Media of Society, 18*(9), 2063–2079. https://doi.org/10.1177/1461444815577797

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: a conceptual framework. *BMJ Quality & Safety, 7*(3), 149–158. https://doi.org/10.1136/qshc.7.3.149

Kowalski, R., & Thompson, M. (2024). Expanding the Sexual Experiences Survey to include technology facilitated sexual exploitation. *The Journal of Sex Research, 61*(6), 897–903.

https://doi.org/10.1080/00224499.2023.2244939
Lievens, E., Livingstone, S., McLaughlin, S., O'Neill, B., & Verdoodt, V. (2018). *Children's rights and digital technologies*. http://doi.org/10.1007/978-981-10-4184-6_16
Liu, Y., & Agur, C. (2023). "After All, They Don't Know Me" Exploring the Psychological Mechanisms of Toxic Behavior in Online Games. *Games and Culture, 18*(5), 598–621. https://doi.org/10.1177/15554120221115397
Llewellyn, C., Cram, L., Hill, R. L., & Favero, A. (2019). For whom the bell trolls: Shifting troll behaviour in the Twitter Brexit debate. *JCMS: Journal of Common Market Studies, 57*(5), 1148–1164. https://doi.org/10.1111/jcms.12882
Ma, H. K. (2011). Internet addiction and antisocial internet behavior of adolescents. *The Scientific World Journal, 11*(1), 2187–2196. https://doi.org/10.1100%2F2011%2F308631
Miller, V. A., Feudtner, C., & Jawad, A. F. (2017). Children's decision-making involvement about research participation: associations with perceived fairness and self-efficacy. *Journal of Empirical Research on Human Research Ethics, 12*(2), 87–96. https://doi.org/10.1177/1556264617696921
Moreno, M. A., Egan, K. G., Bare, K., Young, H. N., & Cox, E. D. (2013). Internet safety education for youth: stakeholder perspectives. *BMC Public Health, 13*, Article 543. https://doi.org/10.1186/1471-2458-13-543
O'Higgins Norman, J., Berger, C., Yoneyama, S., & Cross, D. (2022). School bullying: moving beyond a single school response to a whole education approach. *Pastoral Care in Education, 40*(3), 328–341. https://doi.org/10.1080/02643944.2022.2095419
Oksanen, A., Miller, B. L., Savolainen, I., Sirola, A., Demant, J., Kaakinen, M., & Zych, I. (2021). Social media and access to drugs online: a nationwide study in the United States and Spain among adolescents and young adults. *The European Journal of Psychology Applied to Legal Context, 13*(1), 29–36. https://dx.doi.org/10.5093/ejpalc2021a5
Ong, M.-S., Lakoma, M., Gees Bhosrekar, S., Hickok, J., McLean, L., Murphy, M., Poland, R.E., Purtell, N., & Ross-Degnan, D. (2021). Risk factors for suicide attempt in children, adolescents, and young adults hospitalized for mental health disorders. *Child and Adolescent Mental Health, 26*(2), 134–142. http://dx.doi.org/10.1111/camh.12400
Ortega-Barón, J., Machimbarrena, J. M., Montiel, I., & González-Cabrera, J. (2023). Viral internet challenges scale in preadolescents: An exploratory study. *Current Psychology, 42*(15), 12530–12540. https://doi.org/10.1007/s12144-021-02692-6
Paat, Y. F., & Markham, C. (2021). Digital crime, trauma, and abuse: Internet safety and cyber risks for adolescents and emerging adults in the 21st century. *Social Work in Mental Health, 19*(1), 18-40. https://doi.org/10.1080/15332985.2020.1845281
Pichel, R., Foody, M., O'Higgins Norman, J., Feijóo, S., Varela, J., & Rial, A. (2021). Bullying, cyberbullying and the overlap: What does age have to do with it? *Sustainability, 13*(15), Article 8527. https://doi.org/10.3390/su13158527
Quintana-Orts, C., Rey, L., & Neto, F. (2022). Beyond Cyberbullying: Investigating When and How Cybervictimization Predicts Suicidal Ideation. *Journal of Interpersonal Violence*, *37*(1-2), 935–957. https://doi.org/10.1177/0886260520913640
Rial, A., Mora-Salgueiro, J., Feijóo, S., Liñares, D., & Braña, T. (2023). Underage problem gambling: With whom, where and why. *Psicothema, 35*(2), 140–148. https://doi.org/10.7334/psicothema2022.238
Rieger, D., Kümpel, A. S., Wich, M., Kiening, T., & Groh, G. (2021). Assessing the extent and types of hate speech in fringe communities: A case study of alt-right communities on 8chan, 4chan, and Reddit. *Social Media+ Society, 7*(4), Article 20563051211052906. https://doi.org/10.1177/20563051211052906
Ryding, F. C., & Kaye, L. K. (2018). "Internet Addiction": A Conceptual Minefield. *International Journal of Mental Health and Addiction, 16*(1), 225–232. https://doi.org/10.1007/s11469-017-9811-6
Santos, I. L., Pimentel, C. E., & Mariano, T. E. (2023). Online trolling: The impact of antiso-

cial online content, social media use, and gender. *Psychological Reports, 126*(3), 1416–1429. https://doi.org/10.1177/00332941211055705

Schoenebeck, S., Lampe, C., & Triêu, P. (2023). Online harassment: Assessing harms and remedies. *Social Media + Society, 9*(1), Article 20563051231157297. https://doi.org/10.1177/20563051231157297

Selwyn, N., & Aagaard, J. (2021). Banning mobile phones from classrooms: An opportunity to advance understandings of technology addiction, distraction and cyberbullying. *British Journal of Educational Technology, 52*(1), 8–19. https://doi.org/10.1111/bjet.12943

Singh, S., Pandey, N. M., Datta, M., & Batra, S. (2021). Stress, internet use, substance use and coping among adolescents, young-adults and middle-age adults amid the 'new normal' pandemic era. *Clinical Epidemiology and Global Health, 12*, Article 100885. https://doi.org/10.1016/j.cegh.2021.100885

Slaughter, A., & Newman, E. (2022). New frontiers: Moving beyond cyberbullying to define online harassment. *Journal of Online Trust and Safety, 1*(2). https://doi.org/10.54501/jots.v1i2.5

Soares, F.B., Gruzd, A., Jacobson, J., & Hodson, J. (2023) To troll or not to troll: Young adults' anti-social behaviour on social media. *PLoS ONE, 18*(5), Article e0284374. https://doi.org/10.1371/journal.pone.0284374

Sun, R., Rieble, C., Liu, Y., & Sauter, D. (2022). Connected despite lockdown: the role of social interactions and social media use in wellbeing. *Collabra: Psychology, 8*(1), Article 37061. https://doi.org/10.1525/collabra.37061

United Nations Educational, Scientific and Cultural Organisation [UNESCO] (2020). *International Conference on School Bullying: Recommendations by the Scientific Committee on Preventing and Addressing School Bullying and Cyberbullying*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000374794

United Nations Children's Emergency Fund [UNICEF] (2020). *COVID-19 and its Implications for Protecting Children Online*. UNICEF. https://www.unicef.org/documents/covid-19-and-implicationsprotecting-children-online

Tandoc Jr, E. C., Goh, Z. H., Wong, D. K. J., & Zhang, L. (2023). The good, the bad, and the Internet: Investigating the impact of online prosocial and anti-social behaviors on well-being. *Cogent Social Sciences, 9*(1), Article 2225834. https://doi.org/10.1080/23311886.2023.2225834

Tuters, M., & Hagen, S. (2020). (((They))) rule: Memetic antagonism and nebulous othering on 4chan. *New Media & Society, 22*(12), 2218–2237. https://psycnet.apa.org/doi/10.1177/1461444819888746

Whittle, H. C., Hamilton-giachritsis, C. E., & Beech, A. R. (2014). In their own words: young peoples' vulnerabilities to being groomed and sexually abused online. *Psychology, 5*(10), 1185–1196. https://doi.org/10.4236/psych.2014.510131

World Health Organization [WHO]. (2019a). International classification of diseases for mortality and morbidity statistics (11th ed.). https://icd.who.int/browse11/l-m/en

World Health Organization [WHO]. (2019b). *Helping Adolescents Thrive*. http://www.who.int/mental_health/maternal-child/guidelines_promotive_interventions/en/

III

PREVENTION AND INTERVENTION

14

THE ROLE OF PEDIATRICS AND PRIMARY CARE IN DIGITAL ADDICTIONS

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ABSTRACT:

The term behavioral addiction describes loss of control over rewarding behaviors that are done in excess despite negative consequences. Little research has been devoted to investigating treatments for behavioral addictions though, given the similarities with substance use disorders, interventions may be transferable. Behavioral addictions are relevant to children and adolescents because behaviors become more problematic with earlier adoption. Pediatricians have historically served as front-line professionals encouraging children and families to adopt healthy behaviors. Education in the well-child annual visit is regularly conducted to prevent injuries or chronic disease. Considering their central role in the healthcare of children, primary care offices can serve as central hubs to promote early healthy habits, especially at a time of concerns over children's use of digital technology. One method to promote healthy behaviors is through screening, brief interventions, and referral to specialists. This approach complements a similar framework used to identify and intervene in substance use disorders. This chapter reviews digital addictions and outlines recommendations for evidence-based pediatric screening, brief interventions, and referral to specialized treatment. It focuses on social media use because this behavior is common among pediatric primary care patients given the recent pervasive and rapid adoption of new technologies with addictive potential, facilitated by the widespread use of smartphones among youth.

KEYWORDS:

digital addictions, early habit-formation, screening, pediatricians, behavioral health interventions

1. INTRODUCTION

The concept of behavioral addiction was initially introduced by Marks (1990) to include a range of behaviors done in excess despite negative consequences, resulting in loss of control. These behaviors include uncontrolled internet gaming, gambling, and social media use. The components model of addiction (Brown, 1993) was later adapted by Griffiths (2005) to define non-substance addictions, noting common components with psychoactive substances, including salience (or importance) of the behavior in a person's life, mood modification as a result of engaging in the behavior, tolerance (need to increase the frequency or amount of the behavior to achieve the same effect), withdrawal (unpleasant feeling when discontinuing or reducing the behavior), interpersonal and intrapersonal conflict resulting from engaging in the behavior, and recurrence or relapse. Behavioral and substance use addictions differ around the object of the addiction (i.e., social media or video games in behavioral addictions versus alcohol and drugs in substance use disorders), but share neurobiological and phenomenological commonalities, their natural history, and the phenotype of behavioral automaticity that distinguishes them from purposeful behavior (Lipton et al., 2019).

Despite these similarities, there is controversy about the overuse of the term "behavioral addictions". One concern is that certain components of substance use addictions, such as tolerance, may not reliably describe pathological addictive behaviors. Instead, these components could be described in high involvement users who otherwise do not present core features of addiction such as loss of control or negative consequences. This conceptualization of excessive behaviors as addictions would increase the risk of pathologizing behaviors of everyday life (Billieux et al., 2019). Knowing its limitations, and given the focus of this chapter, we will henceforth use the term digital addictions. Nonetheless, given the overlap of certain layers across substance use and non-substance use addictions, comparable approaches and interventions may benefit both.

Addictive behaviors are distinguished from simple habits in the degree to which the person engages with the behavior. The threshold for disorder is determined by the persistence of the behavior despite negative consequences. Many behaviors resulting in addiction can be healthy or harmless when done in moderation. Therefore, full abstinence is not always possible or preferable. Instead, the goal is a focus on balanced engagement with the behaviors.

The pervasive and rapid adoption of smartphones by pediatric populations in the last decade has raised concerns about their potential addictive nature and effects on youth mental health (Derevensky et al., 2019). These concerns have led the U.S. Surgeon General to issue an advisory about the effects of social media on youth mental health and to urge immediate action, including warning labels on all social media platforms to educate the public about healthy social media use (*Surgeon General Issues New Advisory About Effects Social Media Use Has on Youth Mental Health*, 2023). Concerns about digital addictions were exacerbated during the COVID-19 pandemic, when measures to prevent viral transmission interrupted traditional activities done outside of the home such as in-person schooling, sports participation, and social activities (Király et al., 2020). This forced isolation increased the value of alternative rewarding behaviors such as social media engagement. While there has largely been a return to normal activities, the decline of in-person interactions over time (Helliwell & Huang, 2013; Shakya & Christakis, 2017) has been attributed to the emergence of smartphones and social media platforms (Twenge et al., 2019).

However, social media alone are unlikely to be displacing face-to-face relationships (Hall & Liu, 2022) and rather seem to be displacing other types of media consumption. In some individuals, social media may compensate for a lack of in-person interactions. For others, excessive social media use may be a symptom of maladaptive coping or difficulties with self-regulation due to underlying mental health comorbidities (Bickham, 2021). Furthermore, the associations found between social media use and mental health outcomes could be direct or mediated by other factors, such as disrupted sleep (Alonzo et al., 2021).

Pediatricians have historically served as front-line professionals encouraging children and families to adopt healthy behaviors. They also diagnose and treat most mental health disorders such as attention deficit hyperactivity disorder (ADHD) and depression, and are called upon to identify, prevent and intervene in teen substance use. Education in the well-child annual visit is regularly conducted to prevent injuries by recommending seat belts and helmet use, or chronic disease such as metabolic syndrome though diet and exercise. Given their central role in children's healthcare, primary care offices could serve as a central hub to promote healthy social media use habits. Both health promotion and disease prevention can be done through screening, brief interventions, and referral to specialists. This complements similar interventions already conducted for adolescent substance use disorder treatment.

This chapter reviews the literature, outlines recommendations, and proposes a framework for screening, brief intervention, and referral to treatment for youth with behavioral addictions. The focus of this chapter is on on digital technology addictions such as social media use due to their prevalence in pediatric populations, the emergent literature supporting their impact on health, and the scarcity of available guidance to address them.

2. EPIDEMIOLOGY OF DIGITAL ADDICTIONS

There is significant variability in the prevalence of behavioral addictions, in part due to the variety of screening tools, inconsistency in terminology, and differing thresholds to define disordered behavior. For example, 'video game addiction,' 'problematic internet gaming' or 'video gaming,' 'internet addiction,' and 'problematic internet use' have all been used to describe digital addictions.

Excessive internet use or internet addiction is thought to affect around 13.6% of the world population, but the prevalence varies by culture, population, and threshold used for diagnosis (Fumero et al., 2018). Problematic social media use has been studied both as a stand-alone concept and under the umbrella of internet addiction. Smartphones facilitate access to social media. Some have suggested that the 'apps' are the source of the addictive behaviors, and the smartphone is merely the tool to access them. Given the overlap of behaviors conducted on-line and through screens, the use of broader terms that capture the full spectrum of media used (i.e., pornography, social media, information-seeking) have been recommended as they are less likely to become obsolete in the rapidly changing landscape of digital media. The term 'problematic interactive media use' is one such term proposed to capture this range of behaviors.

Worldwide, over half of the 8.08 billion people use social media and spend an average of nearly 2 and a half hours on social media daily (Datareportal, 2024). A smaller sample of all social media users present problematic use. The global prevalence of social media addiction or problematic use is thought to be around 17%, with differences by geography (i.e., higher in the eastern Mediterranean region and in lower/middle income countries), culture (higher in collectivistic societies), and time period, as it increased after the pandemic. Given the near universal use of social media, a balanced engagement with these 'apps' can pose challenges. The prevalence of other behavioral addictions is lower in pediatric populations. The prevalence of disordered gambling ranges between 3-8% in youth, and is higher than in adults (0.5 to 2%). Even among adults, the highest rates of gambling disorder are among the youngest group (ages 18-25; Calado et al., 2017; Volberg et al., 2010). Gaming disorder's prevalence ranges from 1 to 4.6% among children and adolescents, with rates thought to be about four times higher among males than females (Fam, 2018; Stevens et al., 2020).

3. THE ROLE OF PEDIATRICS AND PRIMARY CARE IN PREVENTING BEHAVIORAL ADDICTIONS

During the 20th century, primary care evolved from a fee-for-service model to an inclusive model of public health interventions and guidance for all populations. In this context, the goals shifted to include acute, chronic, and preventative services. Both ill and healthy children were treated in what later became known as the 'medical home.' As deaths by infectious disease declined over time, the focus of primary care shifted to health maintenance with a greater attention given to interventions for behavioral, academic, and social problems. During the 21st century, there has been an increase in chronic illnesses such as ADHD, obesity, type II Diabetes, and mental health problems, many of which are modifiable with healthy habits.

Primary care is expanding to include guiding children in achieving 'wellness' by targeting health-related behaviors such as sleep, nutrition, and exercise, and providers need training in behavior change to prevent the onset and/or treat both acute and chronic conditions. In this future pediatric home, measures of sleep and exercise will be tracked like vital signs. Already in 2008, the American Academy of Pediatrics (AAP) saw a role for pediatricians in health promotion not only to advance safety, nutrition, physical activity and mental health, but also to prevent and treat substance use, and promote a healthy and safe social media use.

4. ANTICIPATORY GUIDANCE AND PREVENTION

Pediatricians help prevent acute and chronic illnesses by recommending safety measures to prevent injuries, vaccinations to prevent infection, and healthy nutrition and exercise, and moderation in screen time to prevent chronic disease like obesity. Anticipatory guidance also has a place in preventing digital addictions.

The AAP has policy statements on media for youth ages ranging from preschool to middle school and high school (Hill et al., 2016). Discussions about screen limits can start in early childhood. The recommendations highlight the limited evidence of any media use benefits for children younger than 2 years of age. The AAP cautions against the use of media for educational purposes at this age, given that emotional and cognitive learning takes place through unstructured play that happens in person and through interactions with caregivers. Concerns related to heavy media use include associations with increased Body Mass Index in preschool age children, sleep disturbance, and disruption of cognitive, language and social-emotional development due to decreased interaction with family members. The AAP concludes that evidence is sufficient to recommend limiting digital media use in preschool. For children younger than 18 months, use of digital media is entirely discouraged unless it is used for video-chatting with close relatives. For those between 18 and 24 months of age, high-quality programming and apps, and

joint use with an adult is encouraged, though the best form of interaction for children is with other people and not through screens (Hill et al., 2016). For children between 2-5 years of age, limiting media use to one hour a day is recommended. Pediatricians can start asking about family media use, habits, and locations early on, educating about the need for unstructured play for healthy development, recommending media-free times and spaces, and helping parents problem-solve.

For school-age children between the ages of 5-18 years, concerns include media's interference with learning (especially when used during homework), exposure or displays of health risk behaviors (i.e., substance use, self-injuries, disordered eating), cyberbullying, sexting, glorification of mental illness, physical health comorbidities, and privacy issues. Pediatricians are encouraged to screen for problematic interactive media use and to work with families and schools providing education on media risks and benefits and promoting media literacy.

While AAP guidelines for media use were updated in 2016, few pediatricians provide education to their patients and family members about social media use, and only one in five parents of children younger than 8 are familiar with these guidelines (Hill, 2020). Furthermore, while it is relatively easy to monitor the use of passive media (T.V. watching) and gaming, less than half of parents report being aware of the social media content to which their children are exposed (Lauricella et al., 2021; Rideout, 2019).

As consensus on regulation remains elusive, much of the burden for safely navigating a world rich with social media apps falls to the home environment. Families can help shape behaviors by instilling healthy routines, a variety of off-screen activities, and careful placement of cues (e.g., keeping digital devices in a different location from schoolwork and sleep areas). Parents or guardians may take measures to add structure, such as programming outdoor activities and regular exercise, helping children navigate unstructured time with scheduled or limited blocks of social media use, and delaying the age of smartphone adoption. In-home activities like playing board games and having dinners together can help dissuade children from excessive digital media use.

Family time is correlated with improved health and academic performance for children. Authoritative (high degrees of warmth with a focus on rewarding good behaviors) versus authoritarian (low warmth with a focus on punishing undesirable behaviors) parenting approaches are most helpful in shaping behaviors (Pressman et al., 2014). Parents and caregivers can model moderation of their own use of social media. There is also a movement that advocates for a delay in smartphone use. Websites such as *Wait Until 8th* encourage delaying the purchase of a smartphone for children (https://www.waituntil8th.org). Other online resources (e.g., healthychildren.org) provide tools to create an individualized Family Media Plan and suggest ideas for balancing technology use with other activities (i.e., planning a daily screen-free activity as a family), communicating about media content (i.e., discussing upsetting content, becoming aware of how it is connected to one's mental health and emotions), emphasizing kindness and empathy (i.e., having a plan to deal with cyberbullying), discussing rules for online safety (i.e., avoid oversharing),

creating screen-free zones (i.e., keeping meals and bedrooms at night time screen-free), choosing times free of distractions from screens (i.e., having a screen-free day weekly, avoiding screens before school), choosing good content (i.e., reviewing new video games together), and using media as a family more often (i.e., planning movie nights).

5. SCREENING BRIEF INTERVENTION AND REFERRAL TO TREATMENT (SBIRT): A TRANSPOSABLE MODEL

According to the World Health Organization, primary care meets most of a person's health needs in their lifetime. Pediatricians see children longitudinally throughout key years in their development. The public health model guides preventive interventions that are transposable to all health problems. Regarding substance use disorders, a model of screening, brief intervention, and referral to treatment (SBIRT) was designed for prevention and early intervention in primary care and general (non-specialized) settings such as schools, emergency rooms, and other community settings considered natural spaces to implement SBIRT (Mitchell et al., 2013; Levy et al., 2016). With an intended focus on early detection and intervention, this model also closes treatment gaps through provision of evidence-based brief interventions and referral to specialized treatment. While the model was designed to identify and treat adolescents at high risk for substance use and associated problems and disorders, it has potential as a framework for the detection and treatment of other addictive behaviors such as excessive digital media use (see example in Table 1).

Table 1. *Approach to Problematic Social Media Use in Pediatrics: An example of behavioral addiction management*

Population	Intervention	Components
All Patients	Anticipatory Guidance	Delay Age of Use
		Educate on Negative Effects
		Provision of Resources
	Screening	Screen when concerns for behavior done in excess arise
Low Risk	Brief Intervention	Promotion of Healthy Behaviors
		Good Habit-Forming Tips
		Advise on short-term abstinence
Medium Risk	Brief Interventions	Forming Healthy Habits
		Brief interventions based on motivational interviewing (MI) and cognitive-behavioral therapy (CBT)
High Risk	Referral to Services	Referral to Psychiatrist or Psychologist for motivational interviewing (MI), cognitive-behavioral therapy (CBT) and contingency management (CM)
		Admission to services if safety concerns arise

6. SCREENING FOR DIGITAL ADDICTIONS

In the U.S., more than 95% of adolescents own a smartphone (Vogels et al., 2022), and half spend 4.8 hours daily on social media in average (Gallup: *Teens spend average of 4.8 hours on social media per day*, 2023). Younger age and higher impulsivity are risk factors for problematic digital screen use. Problematic and addictive behaviors often travel together, suggesting an individual proneness to addiction. Therefore, identifying young children who may be more impulsive and at risk for behavioral addictions is key.

Several tools exist to screen for behavioral addictions and help determine when social media use is becoming problematic. Screening results should be used to triage into risk groups and determine the appropriate intervention. Each tool should have clear cut-offs for the different levels of risk. Specific examples of digital media screening tools that could be used are displayed in Table 2.

Table 2. *Examples of short Screening Tools for Digital Addictions in Youth**

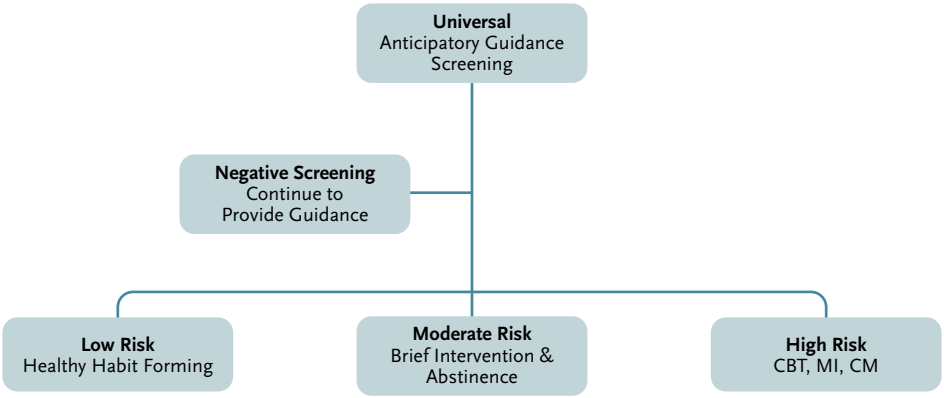
Behavioral Addiction	Validated screen	Description
Internet	Internet Addiction Questionnaire (Young, 2004)	20 item self-report questionnaire for adolescents and up to screen for internet addiction
	Problematic Internet Use Questionnaire Short-Form (Demetrovics et al., 2016)	6-item self-report questionnaire with 3 factors: obsession, neglect, control disorder
Social Media	Bergen Social Media Addiction Scale (Andreassen et al., 2016)	6-item self-report questionnaire that reflect the components of the Griffith's addiction model
	Social Media Scale (Lin et al., 2016)	22-item questionnaire based on five dimensions: social interaction, entertainment, information-seeking, convenience, and social comparison
Gaming	Internet Gaming Disorder Scale-Short Form (Pontes & Griffiths, 2015)	9-item Likert scale measure including 9 core criteria of the DMS-5 (APA, 2013)
	Game Addiction Scale -short version (Lemmens et al., 2009)	7-item scale measuring 7 criteria of computer addiction based on Griffiths' addiction components
Smartphone	Mobile Phone Problem Use Scale (Bianchi & Phillips, 2005)	27- items measuring tolerance, escape from other problems, withdrawal, craving, and negative life consequences
	Smartphone Addiction Scale (Kwon et al., 2013)	10-item questionnaire measuring connectedness, productivity, empowerment, anxious attachment, addiction, continuous use

*[Table shortened and adapted to include social media use, from Behavioral Addictions in Children: A Focus on Gambling, Gaming, Internet Addiction, and Excessive Smartphone Use; Derevensky et al. (2022)].

7. BRIEF INTERVENTIONS

Brief interventions by a primary care professional can have a broader effect on all health-related behaviors, adding minimal burden to the clinician. The SBIRT model begins with normalizing the discussion of substance use in the primary care setting. Patients are provided a short, confidential, and validated screening tool that asks about past year substance use. Those who indicate no use receive positive reinforcement and, if time permits, a hypothetical discussion around problem-solving with the clinician. Those who indicate occasional use are engaged in further discussion and brief intervention utilizing health-related education and advice, given in a manner consistent with MI, and a plan is made for continued discussion. Those who use substances regularly or have exhibited significant negative health outcomes secondary to use are provided the above as well as referrals to more specialized substance use assessment and treatment. Evidence suggests that using wellness visit time to explore media use can have positive effects (Aragon Neely et al., 2013). Therefore, a similar model can be applied to digital and other behavioral addictions (Figure 1).

Figure 1. *Algorithm for Pediatricians Addressing Behavioral Addictions: the case of digital media use*



Habits are ingrained behaviors that are performed automatically. Addictions are an extreme form of these behaviors (Robbins & Costa, 2017). Unlike purposeful behaviors that decrease when the outcome is not desired, habits persist regardless of the outcome. Research on the psychology of habit-formation shows that there are opportunities for general practitioners to intervene before the behavior becomes pathological. Brief advice on how to achieve a healthy lifestyle, focused on advising which behaviors to change and why, can be effective and feasible to implement by general practitioners (Lawlor et al., 2000). However, this brief advice does not generally supply the tools needed to maintain behavior change, and improvements are rarely sustained. Additionally, behavioral interventions are often perceived as too complex to be implemented in pediatric

offices (Jeffery et al., 2000). Pediatricians can give education on basic principles of behavior change to help patients and parents understand not just *what* behaviors to change and *why*, but also *how* to change them. These principles include the need to repeat the desired behavior for about 10 weeks (as opposed to the 2 weeks popularly accepted) or until it becomes automatic or unconscious, by linking the behavior to certain contextual cues and starting with small and easily attainable behaviors that will give the patient confidence in changing more complex behaviors (i.e., going for a walk after doing homework instead of browsing social media to unwind). Because it is easier to add healthy behaviors than to try to remove unhealthy behaviors, finding substitute behaviors is paramount (Lally & Gardner, 2013).

Explaining how habits form may empower youth to shape their own health by understanding the connections between their choices (e.g., nutrition, sleep, exercise, and screen time) and health outcomes (e.g.; obesity, depression). Understanding habit-formation also reinforces the concept that behavioral health is a part of overall health. The intrinsic connection between behavior and health applies also to excessive digital technology use, including social media. Furthermore, the displacement of healthy activities such as sleep, or time spent outdoors, has been thought to be the cause for the negative mental health impacts of digital technology use (Hall & Liu, 2022b). On the other hand, a healthy lifestyle can positively affect mental health (Maenhout et al., 2020). Therefore, recommendations for parents and children include promoting health-related behaviors such as having a daily routine and creating schedules that include work/study, socialization, sleep, leisure time outdoors, and exercise. Children can learn to schedule their use of digital technologies at limited times, avoiding use at night or early in the morning, and prioritizing other activities, such as school work, sports, and face-to-face time with friends and family.

In substance use disorders, brief interventions range from a short conversation delivered during a routine healthcare appointment to several (2-3) counseling sessions. Another well-known type of brief intervention is the Brief Negotiated Interview (BNI), which involves a brief screening, a discussion of the results, a decisional balance exercise (examining benefits and negative consequences of use), a discussion about the internal and external triggers and cravings, an exercise to determine how important is change for the adolescent and the degree of confidence about change called 'readiness to change ruler,' and a plan of change, setting up goals to reduce or stop using. The presence of a trained health advocate or behavioral health professional in primary care can help in delivering effective interventions such as the BNI, and other brief interventions such as those inspired in MI techniques and CBT strategies (Winters et al., 2023). All of these interventions can fuel momentum for change.

Abstinence from behaviors is embedded in the very popular 12-step programs, many of which have been formed around behavioral addictions. However, unlike for substance use disorders, long-term abstinence may not be sustainable in behavioral addictions and could even be counterproductive. Instead, long-term controlled behavior should

be the goal. Some have proposed engaging in brief periods of abstinence as a way to manage and take control of the behavior. These short periods of abstinence have the advantage of disengaging the person from unrestrained and continued behavior, and engaging the person in self-control, increasing their insight (Fernandez et al., 2020). Short-term abstinence has been suggested as a clinical intervention to 'reset' the brain in behavioral addictions. While most research on short abstinence periods has been done on exercise addiction, this practice shows promise for addressing problematic behaviors such as gaming, pornography, smartphone, and social media use.

Therapy-based interventions seem to be more effective than abstinence- or reduction-based interventions (Plackett et al., 2023). CBT combined with a short-term abstinence intervention consisting of taking eight 2.5-hour breaks from social media over a two-week period and completing daily dairies (compared to a group using as social media as usual and doing daily diaries) improved life satisfaction. The effect varied by the time of the day when users engaged in abstinence (work hours vs. off hours) and the level of use (heavy social media users versus average users; Zhou et al., 2021). There is sufficient support of CBT for internet addictions (Zajac et al., 2017), though, these studies did not measure social media addiction specifically (Pontes et al., 2015; Weinstein et al., 2014; Wölfling et al., 2014; Zajac et al., 2017). While not enough research has been conducted on social media-specific interventions, CBT has shown to be effective for internet gaming disorder, social media addiction, online porn and shopping addictions (Sherer & Levounis, 2022). Finally, restrictions put in place by adults involved in the child's life may be beneficial in decreasing time spent on social media. It is important to highlight a role for family interventions, such as family therapy, in the treatment of digital media use concerns. It has also shown to be effective for internet addiction (Liu et al., 2015; Rothwell, 2023; Shek et al., 2009).

Pharmacological interventions for problematic social media use are understudied, but there is some promise for the utility of stimulants (i.e.: methylphenidate), and antidepressants (i.e.: escitalopram, buproprion; Song et al., 2016) for the treatment of digital addictions. Evidence regarding medications indicates that treating comorbid disorders such as depression, ADHD and obsessive-compulsive disorder can improve problematic internet use (Bipeta et al., 2015; Han et al., 2009; Han & Renshaw, 2012).

8. REFERRAL TO TREATMENT

Some patients may require expertise beyond that of the primary care provider and can benefit from a referral to a behavioral health professional, who may or not be embedded in the primary care office. Many patients will have co-occurring disorders and treatment of these other disorders will likely lead to improvements in the problematic behavior. Often, counseling will eventually lead to discussing and addressing the problematic behavior even if the patient is not initially interested in behavior change.

There is an association between behavioral addictions and mental health problems. It is key to consider comorbidities such as depression, anxiety, lower life satisfaction and sleep problems, which are more strongly associated to excessive media use than to other problematic behaviors such as gambling, or substance use concerns. In cases with severe symptoms such as school avoidance, aggression, or suicidality, placement in a psychiatric level of care beyond outpatient management may be warranted.

9. SCHOOL, COMMUNITY AND SOCIETAL INTERVENTIONS

Children spend a significant amount of time in schools, which can provide a natural break from digital technology, with potential positive effects in student academic, behavioral, and social outcomes. Likewise, schools can educate children and parents about the potential negative effects of excessive digital media use. Furthermore, they can teach about good habit-formation and promote Digital Media Citizenship within their health curriculums. While a challenge, given the trend to adopt technology as a means of teaching in the classroom in many schools, learning how to adopt technology to complement and not substitute traditional teaching methods should be the general message. Pediatricians should consider supporting individual accommodations in school for those children struggling with digital addictions, such as options for technology-free assignments.

10. POLICY-LEVEL RECOMMENDATIONS

It is easy to feel powerless with regard to advocacy for regulation change, especially given the constant change in digital media specifics, such as the recent development of artificial intelligence and its inclusion in education, and the power of large digital media companies. However, Pediatricians and other health professionals are poised to add strength and value to discussions of public policy, working together to keep children's interests at the forefront of discussions about evolving technologies, and ensuring that appropriate recommendations are implemented. Public health campaigns, guidance on the appropriate age for acquisition of smartphones and exposure to social media, and federal and state restrictions on the use of addictive app features and youth access should involve pediatric clinicians.

11. CONCLUSIONS

Screening, brief interventions, and referral in primary care settings can have broad effects on all health-related behaviors, adding minimal burden to the clinician. Anticipatory guidance that explains how habits are formed may serve the purpose of empowering

youth to shape their own health by understanding the connections between their choices and their health outcomes. It also reinforces the concept that behavioral health is a part of overall health and that the two are intrinsically linked. This chapter proposes a framework for screening, brief intervention, and referral to treatment for youth with behavioral addictions, with a focus on digital technology addictions. This framework complements existing interventions for youth with substance use concerns, and based on public health strategies that range from universal primary prevention, to secondary prevention for patients at risk, and tertiary prevention for those in need of specialized treatment for behavioral addictions. Said framework is indispensable during the new transition of primary care toward a behavior-based focus to increase wellness and wellbeing.

REFERENCES

AAP Council on Communications and Media. (2016). Media use in school-aged children and adolescents. Pediatrics (Evanston), 138(5), 1.

Alonzo, R., Hussain, J., Stranges, S., & Anderson, K. K. (2021). Interplay between social media use, sleep quality, and mental health in youth: A systematic review. Sleep Medicine Reviews, 56, 101414.

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. Psychology of Addictive Behaviors, 30(2), 252-262.

Aragon Neely, J., MD, Hudnut-Beumler, J., BA, White Webb, M., MD, Chavis, A., MD, Dietrich, M. S., PhD, Bickman, L., PhD, & Scholer, Seth J., MD, MPH. (2013). The effect of primary care interventions on children's media viewing habits and exposure to violence. Academic Pediatrics, 13(6), 531-539.

Bianchi, A., & Phillips, J. G. (2005). Psychological predictors of problem mobile phone use. Cyberpsychology & Behavior, 8(1), 39-51.

Bickham, D. S. (2021). Current research and viewpoints on internet addiction in adolescents. Current Pediatrics Reports (Philadelphia, PA), 9(1), 1-10.

Billieux, J., Flayelle, M., Rumpf, HJ. *et al*. High Involvement Versus Pathological Involvement in Video Games: a Crucial Distinction for Ensuring the Validity and Utility of Gaming Disorder. *Curr Addict Rep* 6, 323–330 (2019). https://doi.org/10.1007/s40429-019-00259-x

Bipeta R, Yerramilli SS, Karredla AR, Gopinath S. (2015). Diagnostic stability of internet addiction in obsessive-compulsive disorder: Data from a naturalistic one-year treatment study. Innovation in Clinical Neuroscience; 12, 14–23. Brown, R. I. F. (1993). Some contributions of the study of gambling to the study of other addictions. In W. R. Eadington, & J. Cornelius (Eds), Gambling behavior and problem gambling. Reno, NV: University of Nevada Press

Calado, F., Alexandre, J., & Griffiths, M. D. (2017). Prevalence of adolescent problem gambling: A systematic review of recent research. Journal of Gambling Studies, 33(2), 397-424.

Datareportal. (2024). Digital 2024: Global overview report. Retrieved from https://datareportal.com/reports/digital-2024-global-overview-report

Demetrovics, Z., Király, O., Koronczai, B., Griffiths, M. D., Nagygyörgy, K., Elekes, Z., ... Urbán, R. (2016). Psychometric properties of the problematic internet use questionnaire short-form (PIUQ-SF-6) in a nationally representative sample of adolescents. *PloS One, 11*(8), e0159409.

Derevensky, J. L., Hayman, V., & Lynette Gilbeau. (2019). Behavioral addictions: Excessive gambling, gaming, internet, and smartphone use among children and adolescents. The Pediatric Clinics of North America, 66(6), 1163-1182.

Derevensky, J., Marchica, L., Gilbeau, L., Richard, J. (2022). Behavioral Addictions in Children: A Focus on Gambling, Gaming, Internet Addiction, and Excessive Smartphone Use. In: Patel, V.B., Preedy, V.R. (eds) Handbook of Substance Misuse and Addictions. Springer, Cham.

Fam, J. Y. (2018). Prevalence of internet gaming disorder in adolescents: A meta-analysis across three decades. Scandinavian Journal of Psychology, 59(5), 524-531.

Fernandez, D. P., Kuss, D. J., & Griffiths, M. D. (2020). Short-term abstinence effects across potential behavioral addictions: A systematic review. Clinical Psychology Review, 76, 101828.

Fumero, A., Marrero, R. J., Voltes, D., & Peñate, W. (2018). Personal and social factors involved in internet addiction among adolescents: A meta-analysis. Computers in Human Behavior, 86, 387-400.

Gallup: Teens spend average of 4.8 hours on social media per day. (2023a, Oct 14,). *Targeted News Service* Retrieved from https://search.proquest.com/docview/2876891770

Griffiths, M. (2005). A 'components' model of addiction within a biopsychosocial framework. Journal of Substance Use, 10(4), 191-197.

Hall, J. A., & Liu, D. (2022). Social media use, social displacement, and well-being. Current Opinion in Psychology, 46, 101339.

Han, D. H., Lee, Y. S., Na, C., Ahn, J. Y., Chung, U. S., Daniels, M. A., ... Renshaw, P. F. (2009). The effect of methylphenidate on internet video game play in children with attention-deficit/hyperactivity disorder. Comprehensive Psychiatry, 50(3), 251-256.

Han, D. H., & Renshaw, P. F. (2012). Bupropion in the treatment of problematic online game play in patients with major depressive disorder. Journal of Psychopharmacology (Oxford), 26(5), 689-696.

Hill, D. L. (2020). Social media: Anticipatory guidance. Pediatrics in Review, 41(3), 112-119.

Hill, D., Ameenuddin, N., Reid Chassiakos, Y. (., Cross, C., Hutchinson, J., Levine, A., ... Swanson, W. S. (2016). Media and young minds. Pediatrics (Evanston), 138(5), 1.

Király, O., Potenza, M. N., Stein, D. J., King, D. L., Hodgins, D. C., Saunders, J. B., Griffiths, M. D., Gjoneska, B., Billieux, J., Brand, M., Abbott, M. W., Chamberlain, S. R., Corazza, O., Burkauskas, J., Sales, C. M. D., Montag, C., Lochner, C., Grünblatt, E., Wegmann, E., Martinotti, G., ... Demetrovics, Z. (2020). Preventing problematic internet use during the COVID-19 pandemic: Consensus guidance. *Comprehensive psychiatry*, *100*, 152180. https://doi.org/10.1016/j.comppsych.2020.152180

Jeffery, R. W., Drewnowski, A., Epstein, L. H., Stunkard, A. J., Wilson, G. T., Wing, R. R., & Hill, D. R. (2000). Long-term maintenance of weight loss. Health Psychology, 19(1S), 5-16.

Kwon, M., Kim, D., Cho, H., & Yang, S. (2013). The smartphone addiction scale: Development and validation of a short version for adolescents. *PLoS ONE, 8*(12), e83558-e83558.

Lally, P., & Gardner, B. (2013). Promoting habit formation. Health Psychology Review, 7(sup1), S137-S158.

Lauricella, A. R., Cingel, D. P., Beaudoin-Ryan, L., Robb, M. B., Saphir, M., & Wartella, E. (2021). *The common sense census: Plugged-in parents of tweens and teens in America, [united states], 2016* ICPSR - Interuniversity Consortium for Political and Social Research.

Lawlor, D. A., Keen, S., & Neal, R. D. (2000). Can general practitioners influence the nation's health through a population approach to provision of lifestyle advice? British Journal of General Practice, 50(455), 455-459. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/10962782

Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. Media Psychology, 12(1), 77-95.

Levy, S. J. L., Williams, J. F., Ryan, S. A., Gonzalez, P. K., Patrick, S. W., Quigley, J., ... Walker, L. R. (2016). Substance use screening, brief intervention, and referral to treatment. Pediatrics (Evanston), 138(1).

Lipton, D. M., Gonzales, B. J., & Citri, A. (2019). Dorsal striatal circuits for habits, compulsions and addictions. Frontiers in Systems Neuroscience, 13, 28.

Lin, L. Y., Wang, C. Y., & Chen, C. J. (2016). The effects of social media on college students . Journal of Educational Technology Development and Exchange, 9(1), 1-14.

Liu, Q., Fang, X., Yan, N., Zhou, Z., Yuan, X., Lan, J., & Liu, C. (2015a). Multi-family group therapy for adolescent internet addiction: Exploring the underlying mechanisms. Addictive Behaviors, 42, 1-8.

Maenhout, L., Peuters, C., Cardon, G., Compernolle, S., Crombez, G., & DeSmet, A. (2020). The association of healthy lifestyle behaviors with mental health indicators among adolescents of different family affluence in belgium. BMC Public Health, 20(1), 1-958.

Media use; "the common-sense census: Media use by tweens and teens" (2015). *Education Week, 35*(13), 5. Retrieved from https://search.proquest.com/docview/1748579844

Mitchell S.G., Gryczynski J., O'Grady K.E., Schwartz R.P., SBIRT for adolescent drug and alcohol use: current status and future directions (2013). Retrieved fromhttp://www.calames.abes.fr/pub/#details?id=Calames-

Plackett, R., Blyth, A., & Schartau, P. (2023). The impact of social media use interventions on mental well-being: Systematic review. Journal of Medical Internet Research, 25(4), e44922.

Pontes, H. M., & Griffiths, M. D. (2015). Measuring DSM-5 internet gaming disorder: Development and validation of a short psychometric scale. Computers in Human Behavior, 45, 137-143.

Pontes, H. M., Kuss, D. J., & Griffiths, M. D. (2015). Clinical psychology of internet addiction: A review of its conceptualization, prevalence, neuronal processes, and implications for treatment. Neuroscience and Neuroeconomics, 4, 11.

Pressman, R. M., Owens, J. A., Evans, A. S., & Nemon, M. L. (2014). Examining the interface of family and personal traits, media, and academic imperatives using the learning habit study. The American Journal of Family Therapy, 42(5), 347-363.

Rideout VJ, R. M. (2019). *The common sense census: Media use by tweens and teens*. San Francisco, CA: Common Sense Media.

Robbins, T. W., & Costa, R. M. (2017). Habits. *Current Biology, 27*(22), R1200-R1206.

Rothwell, J. (2023). *How parenting and self-control mediate the link between social media use and youth mental health* Institute for Family Studies. Gallup.

Shek, D. T. L., Tang, V. M. Y., & Lo, C. Y. (2009). Evaluation of an internet addiction treatment program for chinese adolescents in hong kong. Adolescence, 44(174), 359-373. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/19764272

Sherer, J., & Levounis, P. (2022). Technological addictions. Current Psychiatry Reports, 24(9), 399-406.

Song, J., Park, J. H., Han, D. H., Roh, S., Son, J. H., Choi, T. Y., ... Lee, Y. S. (2016). Comparative study of the effects of bupropion and escitalopram on internet gaming disorder. Psychiatry and Clinical Neurosciences, 70(11), 527-535.

Stevens, C., Zhang, E., Cherkerzian, S., Chen, J. A., & Liu, C. H. (2020). Problematic internet use/computer gaming among US college students: Prevalence and correlates with mental health symptoms. Depression and Anxiety, 37(11), 1127-1136.

Surgeon General Issues New Advisory About Effects Social Media Use Has On Youth Mental Health (2023, May 22,). *US Fed News Service, Including US State News* https://search.proquest.com/docview/2818519783

Twenge, J. M., Spitzberg, B. H., & Campbell, W. K. (2019). Less in-person social interaction with peers among U.S. adolescents in the 21st century and links to loneliness. Journal of Social and Personal Relationships, 36(6), 1892-1913.

Vogels, E., Gelles-Watnick, R., & Massarat, N. (2022). *Teens, social media and technology 2022.* Pew Research Center. Retrieved from Social Science Premium Collection Retrieved from https://search.proquest.com/docview/2713198728

Volberg, R. A., Gupta, R., Griffiths, M. D., Olason, D. T., & Delfabbro, P. (2010). An international perspective on youth gambling prevalence studies. International Journal of Adolescent Medicine and Health, 22(1), 3-38. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/20491416

Weinstein A, Curtiss Feder L, Rosenberg KP, Dannon P. (2014). Internet addiction disorder. *Behav. addict.* (pp. 99–117) Elsevier.

Winters, K. C., Waldron, H., Hops, H., Ozechowski, T., & Montano, A. (2023). Brief interventions for cannabis using adolescents. The Psychiatric Clinics of North America, 46(4), 761-773.

Wölfling, K., Beutel, M. E., Dreier, M., & Müller, K. W. (2014). Treatment outcomes in patients with internet addiction: A clinical pilot study on the effects of a cognitive-behavioral therapy program. BioMed Research International, 2014, 425924-8.

Young, K. S. (2004). *Internet addiction test* APA PsycTests.

Zajac, K., Ginley, M. K., Chang, R., & Petry, N. M. (2017). Treatments for internet gaming disorder and internet addiction: A systematic review. Psychology of Addictive Behaviors, 31(8), 979-994.

Zhou, X., Rau, P. P., Yang, C., & Zhou, X. (2021). Cognitive behavioral therapy-based short-term abstinence intervention for problematic social media use: Improved well-being and underlying mechanisms. Psychiatric Quarterly, 92(2), 761-779.

15

PREVENTION OF NON-SUBSTANCE ADDICTIVE BEHAVIOURS

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ABSTRACT:

Non-substance addictive behaviours (NSAB), such as internet gaming disorder, gambling, or social media addiction, are growing public health concerns. The inclusion of gambling and gaming in mental health diagnostic manuals (APA, 2013; WHO, 2019) has prompted governments to adopt preventive measures. Although internet and social media addiction remain conceptually debated, their potentially harmful effects on adolescent psychosocial development are widely recognised. Unlike substance addictions, NSAB prevention does not aim for abstinence but promotes responsible use through skill development. This chapter reviews two main preventive strategies: psychoeducational and environmental.

School-based programmes, especially for gambling, are the most evaluated. These interventions target cognitive distortions, risk perception, and self-control. While effective in improving knowledge and attitudes, their behavioural impact is limited due to methodological weaknesses, such as lack of follow-up and reliance on self-reports. Environmental strategies, including restrictions on venue proximity to schools and gambling advertising, have shown greater success in reducing prevalence.

In contrast, preventive strategies for video game and social media overuse are still developing. Few evaluated interventions exist, often with limited rigour. Some programmes—mainly involving parental mediation or digital restrictions—have reduced screen time, but their long-term efficacy remains uncertain.

Similarly, despite the high prevalence of problematic internet use among adolescents, few prevention programmes have been rigorously assessed. Four systematic reviews suggest educational and cognitive-behavioural strategies may help, but methodological limitations persist.

In conclusion, while preventive efforts against behavioural addictions are growing and show promise—particularly in schools and environmental policy—more rigorous research and long-term evaluations are needed to confirm their effectiveness.

KEYWORDS:

environmental prevention, school prevention, gambling, videogames, social media

1. INTRODUCTION

The so-called behavioural or non-substance addictions, although recognised in scientific literature for decades, have only recently been included in mental disorder classifications. Since behavioural or non-substance addictions were incorporated into the diagnostic category of addiction in the latest editions of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V, APA, 2013) and the *International Classification of Diseases* (ICD-11, WHO, 2019), governments around the world have included prevention strategies in their addiction action plans, thereby promoting preventive actions, which until then had been sporadic.

In the case of gambling, before its inclusion in *DSM-V* (APA, 2013), the first evaluations of preventive interventions in adolescents appeared in Canada and EEUU in the first decade of the 21st century. A few years later, the first evaluations of prevention programmes were registered in Europe. Since then, the science of prevention applied to gambling has produced a large number of studies, which have prompted the creation of six systematic reviews, which we will analyse in section two of this chapter.

Internet addiction (IA) sparked controversial debates during the review of the *DSM-V*. Proponents relied on compulsive behaviours related to excessive use of the internet, social media, online games, and other digital activities (Block, 2008). However, the final decision was to include Internet Gaming Disorder in section III of the manual, understanding that more research was needed before it could be formally recognised. Nevertheless, the concept of internet addiction had already been explored since the mid-1990s, when several authors suggested criteria for IA akin to those for substance addiction (Goldberg, 1996; Griffiths, 1995; Young, 1996).

Regarding video game addiction, despite the strong advocacy by the American Medical Association for its inclusion as a subtype of addictive disorder in the DSM-V (Hiller, 2014), it was not until the new edition of the ICD-11 (WHO, 2019) that video game use was recognised as a potentially addictive behaviour. However, the idea of

video game addiction had already gained traction within the scientific and clinical communities long before. Several research groups developed, more than a decade in advance, evaluation instruments for video game addiction based on the diagnostic criteria for substance or gambling addiction (Chamarro et al., 2009; Lemmens et al., 2009; Tejeiro & Bersabé, 2002).

There is a wide-ranging debate about addiction to other technological behaviours, such as mobile phone addiction. Despite growing evidence that mobile phone use can become problematic and cause negative consequences, its incidence, prevalence, and precise symptomatology remain controversial (Wolfers & Karsay, 2024). Although there seems to be a consensus in the scientific community that excessive smartphone use poses an impulse control problem, there is no agreement on whether it constitutes an addiction to the device itself or to the applications used on it.

Another behaviour that has recently raised considerable alarm is excessive social media use. Its rapid growth and intensity of use have been linked to a general decline in mental health (Haidt, 2024), depressive symptoms (Barry et al., 2017), poorer sleep quality, and higher anxiety levels (Scott & Woods, 2018).

Non-technological behaviours have also been identified as potential addictive behaviours, such as sex, exercise, or shopping, to name a few. Due to space constraints, in this chapter, we will focus on analysing the state of the art of preventive interventions for two behaviours recognised as potentially addictive in diagnostic manuals: gambling and video games, as well as internet and social media addiction.

Prevention, what prevention?

The prevention of problematic gambling and digital consumption (video games and internet) has mainly focused on three strategies. First, psychoeducational interventions implemented in schools, family prevention, and thirdly, environmental prevention. This chapter focuses on school and environmental prevention.

As we will see in the following sections, school-based prevention offers a greater number of good practices, providing greater rigour in their design and implementation process. In general, school interventions consist of sessions based on cognitive-behavioural strategies aimed at increasing risk perception, promoting critical awareness of social media use, training self-control skills in response to media and peer pressure, and promoting alternative activities. The availability of school-based prevention programmes has allowed for more studies to evaluate their effectiveness.

Environmental prevention is a set of strategies designed to change the environmental conditions that influence people's behaviour (Honeycutt et al., 2015). Environmental prevention is based on the premise that behaviour is largely a response to external stimuli, so the mechanism of action is to influence behaviour in an automatic and sustained manner without requiring constant conscious effort from individuals.

As a result, environmental prevention strategies focus on creating an environment that facilitates healthy behaviour choices and discourages harmful ones by changing the aspects of the environment that contribute to the maintenance of the problematic

behaviour. This includes, among other measures, policies and regulatory frameworks. Environmental prevention strategies aim to make problematic behaviours less accessible, reduce their visibility, promote incompatible alternatives, or increase awareness of excessive or problematic use, ultimately creating environments that decrease the likelihood of problematic behaviours occurring. Burkhart et al. (2021) summarise the characteristics of environmental prevention as follows:

- It aims to change the context in which the behaviour to be prevented occurs.
- It makes healthy behaviours more accessible or attractive than risky behaviours.
- It induces changes in social norms, values, and attitudes as a secondary impact.
- It can be used at different levels of intervention (micro, meso, and macro) or in combination.
- It is particularly applicable in contexts containing potential triggers for the behaviour to be prevented.
- It can have effects on various health risk behaviours.

A good example of these interventions can be found in Sunstein and Thaler (2008) in their "nudge" theory, where they argue that it is possible to design choice environments that help people choose what is best for themselves, their families, and society. A nudge is an easy, often low-cost intervention that modifies the architecture of choice by altering people's behaviour predictably. Behaviour-based interventions may involve altering the way options are presented or framing a message to "nudge" people towards better decisions without limiting choices or using financial incentives. Some authors argue that environmental prevention is generally more effective than skills-based prevention, which in turn is more effective than prevention based on providing information (Foxcroft, 2014).

2. GAMBLING

According to the ESPAD survey, which includes 15-16-year-old youths from 37 European countries, the prevalence of having gambled in the past 12 months is 23%. Of these, an estimated 8.5% of the students are excessive gamblers, almost double the amount reported in the last time (ESPAD Group, 2024). Based on indicators of problem gambling (e.g. the need to bet increasingly large amounts, social or academic impairment, recurrent thoughts about gambling, unsuccessful attempts to quit, among others), the youth population is the age group that has grown the most in recent years. A meta-analysis reviewing studies conducted in 23 countries since the year 2000 estimates that between 0.2% and 12.3% of European adolescents would meet the criteria for problem gambling (Calado et al., 2017), far exceeding the figures found among adults (Gupta et al., 2013).

Research on risk factors that can explain why not all adolescents who start gambling develop problem gambling behaviours has been expanding for two decades. Framed

within the bio-psycho-social and ecological models, various factors have been identified that can interact to initiate, maintain, or exacerbate the frequency and severity of gambling (Derevensky & Gilbeau, 2019; Dowling et al., 2017).

Among the individual factors assessed are: male gender, early age of onset, impulsivity, sensation-seeking, low risk perception, maladaptive coping styles, cognitive distortions, and specific motivations for gambling to win money (Dowling et al., 2017; Dussault et al., 2011; Potenza et al., 2011). In the family setting, factors such as favourable attitudes towards gambling and parental gambling behaviour (Dixon et al., 2016; Langhinrichsen-Rohling et al., 2004), as well as poor parental supervision (Molinaro et al., 2014), have been considered. Regarding interpersonal or relational factors, peer pressure, understood as the perception of a favourable attitude or behaviour towards gambling by friends and close peers, is a significant factor (Derevensky & Gilbeau, 2019). Among macrosocial/sociocultural factors, media influence and the normalisation of gambling behaviour through advertising stand out (Hing et al., 2014). In recent years, preventive initiatives for adolescents have focused their efforts on universal and/or selective prevention.

Of all these risk factors, only a few are amenable to change through psychoeducational intervention. Low risk perception, maladaptive coping styles, cognitive biases and misconceptions, specific motivations for gambling to win money, favourable attitudes towards gambling advertising, and peer pressure are the factors that form the targets of prevention programmes. The following section is dedicated to systematic reviews that analyse the effectiveness of prevention programmes.

2.1 School Prevention

As with the prevention of other risky behaviours, the school environment focuses most efforts on gambling prevention. By June 2024, five systematic reviews and a meta-analysis summarising 30 years of knowledge accumulated from evaluations of the effectiveness of prevention programmes have been identified. Table 1 summarises the characteristics and results of each review.

Table 1. *Systematic Reviews and Meta-analysis of Gambling Prevention Programmes*

Title	Authors, Year	Sample	Components / Strategies	Main Results
Prevention programmes for Youth Gambling: A Review of the Empirical Evidence	Ladouceur, Goulet & Vitaro (2013)	15 programmes, 15 studies (1993-2010)	• Probability of winning. Biases and gambling fallacies • Attitudes towards gambling • Risk perception • Specific skills (problem-solving, decision-making, specific coping)	Increased knowledge of probability and reduced cognitive biases. Heterogeneity in sample size, number of sessions, and application modalities. Most studies do not include gambling behaviour or follow-up measures.

Title	Authors, Year	Sample	Components / Strategies	Main Results
Systematic Review of Empirically Evaluated School-Based Gambling Education Programmes	Keen, Blaszczynski & Anjoul (2017)	19 programmes, 19 studies (1993-2016)	• Cognitive: probability of winning, cognitive biases, randomness, gambling fallacies (100% of programmes) • Risk perception (58% of programmes) • Specific skills (problem-solving, decision-making, coping) (31% of programmes)	Increased knowledge of probability, reduced cognitive distortions, and changes in attitudes towards gambling. Most studies do not assess gambling behaviour.
A Review of Educational-Based Gambling Prevention Programmes for Adolescents	Oh, Ong & Loo (2017)	14 programmes, 17 studies (2002-2014)	• Cognitive: probability of winning, cognitive distortions, randomness, gambling fallacies • Specific skills (problem-solving, decision-making, coping)	Increased knowledge about gambling and correct cognitive biases. Protection-focused programmes could also reduce gambling behaviour.
A Systematic Review of Educational Programmes and Consumer Protection Measures for Gambling: An Extension of Previous Reviews	Forsström, Spangberg, Petterson, Brolund & Odeberg (2020)	6 programmes, 37 studies (2000-2018) Meta-analysis	Not available	Low certainty of evidence for studies with long-term school interventions, indicating potential effects. No conclusions regarding Responsible Gambling measures.
Systematic Review: Preventive Intervention to Curb the Youth Online Gambling Problem	Giménez-Lozano & Morales-Rodríguez (2022)	14 programmes, 15 studies (2010-2021)	• Psychoeducational prevention and skills training programmes • Raise awareness of consequences (Risk perception) • Fallacies and biases • Information about gambling industry • Reduce stereotypes of gamblers • Responsible gambling	All analysed programmes show effective results.
Preventive Gambling Programmes for Adolescents and Young Adults: A Systematic Review	Monreal et al. (2023)	28 programmes, 32 studies	• Raise awareness of consequences (Risk perception) • Correct biases • Encourage critical thought and self-control • Develop coping skills • Train problem-solving	Cognitive: Effective in reducing erroneous ideas about gambling, increased knowledge about odds. Affective: More negative attitudes towards gambling. Behavioural: Good results regarding frequency and severity of gambling.

The reviews indicate that evidence for the effectiveness of gambling prevention programmes is still limited and of low quality due to methodological issues and variability in instruments and variables. Ladouceur et al. (2012) reviewed 15 studies, finding that while interventions helped reduce cognitive distortions and increase knowledge about gambling, the absence of long-term follow-ups and behavioural assessments prevented definitive conclusions. Similarly, Keen et al. (2017) reviewed 19 studies and found positive cognitive effects, but only nine examined gambling behaviour, with just five showing significant changes. These studies also suffered from short follow-ups and inconsistencies in behaviour measurement. Oh et al. (2017) reviewed 14 programmes, highlighting the importance of proper implementation, such as the use of audiovisual materials and trained facilitators. Forsström et al. (2020) conducted a meta-analysis of six studies, suggesting that interventions may have preventive effects on gambling behaviour, though evidence remained weak due to study designs.

The review by Giménez-Lozano and Morales-Rodríguez (2022) analysed 15 studies from 2010 to 2021, mostly on adolescents, and found some effectiveness in cognitive improvements but noted the same methodological issues, such as a focus on cognitive variables without follow-up measures.

The latest review by Monreal et al. (2023) assessed 32 studies of 28 programmes, finding that these aimed to raise awareness, correct biases, and develop problem-solving and self-control skills. The interventions were effective at reducing gambling misconceptions and improving knowledge. Affective changes included fostering negative attitudes towards gambling, and at the behavioural level, 84% of studies reported reductions in gambling frequency and severity.

2.2 Environmental prevention

Another area of action for reducing gambling demand is environmental prevention, understood as the set of policies and interventions aimed at changing aspects of the environment that contribute to the onset and maintenance of gambling behaviour. Its objectives include reducing accessibility and limiting visibility.

2.2.1 *Accessibility*

The availability and accessibility of betting shops are specific situational factors that can be understood through multiple dimensions: geographical, temporal, and social accessibility. These factors are related to environmental characteristics that are external to the activity or the betting shop itself, such as the location of the establishment, the number of shops in a given area, operating hours, advertising strategies, and incentives for players. Geographical accessibility refers to the spatial distribution of shops and gambling opportunities within a geographical area. In the last two decades, studies have proliferated that explore the relationship between the distance from home to a betting shop and gambling frequency (Welte et al., 2015; Young, et al., 2021). The results establish an inverse relationship between distance and gambling frequency. Other studies have

analysed the distance between an educational centre and a betting shop, reaching the same conclusions: the greater the distance, the lower the gambling frequency (Adlaf & Turner, 2004). Based on this evidence, legislators from different countries or regions have established minimum distances between betting shops and between a betting shop and an educational centre. St-Pierre et al. (2014) reviewed 14 U.S. and Canadian studies that analysed various dimensions of accessibility to betting shops and their effect on gambling behaviour in different populations. Nine of them (62%) found a significant inverse relationship between distance and gambling frequency.

2.2.2 *Visibility and Advertising*

Advertising plays an important role in stimulating participation in gambling, both in the general population (Hing et al., 2014) and among young people (Korn, et al., 2008), women (Mccormack et al., 2014), and problem gamblers (Jonsson et al., 2003). The mechanisms of action of gambling advertising include promoting a positive attitude towards gambling and a favourable social perception (Binde, 2009; Derevensky et al., 2010), reducing the risk-perception, normalising gambling activity, facilitating access to gambling, and generating cognitive distortions regarding gambling outcomes (Hing et al., 2014; Newall et al., 2019). Advertising increases the likelihood of gambling more significantly among problem gamblers than non-gamblers (Derevensky et al., 2010). Both social and problem gamblers exhibit greater awareness of gambling advertising, higher participation in gambling, and suggest deeper knowledge about gambling due to advertising, compared to non-gamblers (Hanss et al., 2015), but problem gamblers more frequently admit than social gamblers that advertising increases their participation in gambling (Hanss et al., 2015).

Among adolescents, exposure to gambling advertisements is linked to greater weekly gambling frequency, both in sports betting (Hing et al., 2014) and poker, slot machines, and casinos (Clemens, et al., 2016). A recent meta-analysis (Bouguettaya et al., 2020) suggests a positive association between exposure to gambling advertising and attitudes towards gambling, gambling intention, and gambling behaviour. This relationship has also been observed in underage adolescents (Monaghan et al., 2008), with a stronger relationship in young people exhibiting risky or problematic gambling (Derevensky et al., 2010).

Therefore, reducing the visibility and exposure of gambling products and establishments, restricting advertising, and limiting their presence in public spaces could reduce gambling intentions, usage, and associated problems (Binde, 2014). In Europe, several countries have legislated in this regard. Italy was the first country in 2018 to ban any form of gambling advertising. Subsequently, Spain in 2020 limited advertising to nighttime hours and approved a series of measures aimed at protecting the most vulnerable groups: banning the appearance of public figures, prohibiting promotional offers aimed at attracting customers, and eliminating sponsorships on sports equipment. Other countries have followed suit; Belgium, for example, has decided to restrict

gambling advertising in general. Meanwhile, the Netherlands has focused on limiting mass advertising on television, radio, internet search engines, and public spaces. Germany approved the Interstate Treaty of Gambling in 2021, with the least restrictive regulation of the five countries.

3. GAMING

The WHO report, based on the *Health Behaviour in School-aged Children* survey 2021/2022, states that by the age of 13, 31% of European boys report playing video games for at least four hours a day, while only 21% of girls do the same (Boniel-Nissim et al., 2024). The *European School Survey Project on Alcohol and Other Drugs* provides similar prevalence rates: 17% dedicate four or more hours to video games on school days, and this figure rises to 32% during weekends and holidays. Although time series indicate a convergence in prevalence between genders, gaming remains associated with gender, as boys spend more time than girls on gaming activities, both on school days and non-school days (ESPAD Group, 2024).

In terms of self-perception of problematic gaming, 21% of European students consider that their excessive gaming causes problems related to the time they spend on these activities or negative feelings, which suggests a high risk of gaming-related problems (ESPAD Group, 2024). The prevalence of gaming disorder in minors is estimated to be 3% globally (Stevens et al., 2021), although some authors raise this figure to 4.6% (Fam, 2018).

The risk factors predicting excessive gaming can be grouped into three broad categories. First, the family, as the primary agent of socialisation, plays a crucial role in protecting against risky behaviours (Greenberg & Lippold, 2013; Lippold & Jensen, 2017). In this context, parental mediation is considered a key factor in children's behaviour (Stanger et al., 2004). According to the European Commission, "prevention and better parental control will continue to be the best forms of protection against the risks of ICT and the Internet" (European Commission, 2012).

Psychological characteristics form the second category, with traits such as high impulsivity and sensation-seeking being prominent (Griffiths et al., 2012; Lloret & Morell, 2016; Salvarli & Griffiths, 2019). The third category of risk factors refers to the social context, with a higher rate of social isolation and feelings of loneliness (Stockdale & Coyne, 2018; van den Eijnden et al., 2018). These factors, identified in population studies, guide the objectives and serve as the basis for the design of prevention programmes.

3.1 School-based Prevention

School-based prevention of video game use is relatively recent, and no reviews have been found. A search for empirical studies evaluating the effectiveness of these programmes identified seven programmes, five from Europe and two from China. Six are

school-based programmes and one is family-based. Additionally, six programmes are universal prevention programmes, and one is selective or indicated prevention.

Table 2. *Problematic Video Game Use Prevention Programmes*

Programme	Author (Year)	Country	Characteristics	Objectives (Results)
A Healthy School	Leurs et al., 2005	Netherlands (Utrecht)	Scope: School Level: Universal Format: In-person Sessions: 64, no info on video game module Frequency: Weekly Duration: 2 hours/session	- Prevent internet and video game addiction - Promote general health, no specific focus
UHS Utrecht Healthy School	Bamekow, 2005	Netherlands (Utrecht)	Scope: School Level: Universal Format: In-person Sessions: 30 per course, no info on video game module Frequency: Not reported Duration: 50 minutes/session Facilitator: Trained teacher Techniques: SHE Model	- Reduce excessive or compulsive internet and video game use - Promote general health, no specific focus
Vernetzte Welten	Walther et al., 2014	Germany	Scope: School Level: Universal Age: 12-13 years Format: In-person Sessions: 4 Frequency: Weekly Duration: 90 minutes/session Facilitator: Trained teacher Techniques: Self-observation, discussion, reflection	- Promote self-reflection and self-control to reduce problematic video game use
WIT Wise IT-Use	Chau, Tsui & Cheng, 2019	Hong Kong	Scope: School Level: Universal Age: 7-13 years Format: Mixed (Digital & In-person) Sessions: Not specified Duration: 3 months	- Mitigate consequences of gaming disorder
—	Bonnaire, Serehen & Phan (2019)	France (Paris)	Scope: School Level: Universal Age: 13-14 years Format: In-person Sessions: 1 Duration: 90 min/session Facilitator: Expert	- Raise awareness of time spent gaming - Increase risk perception - Reduce severity
GOI Game Over Intervention	Li, Chau & Cheng (2019)	China (Hong Kong)	Scope: Family Level: Universal Sessions: 1 session with 3 modules Duration: 240 min/session Facilitator: Not specified	- Parental monitoring, fostering warmth (parents), reducing gaming behaviour, exposure to violent video games

Programme	Author (Year)	Country	Characteristics	Objectives (Results)
PROTECT Professional Use of Technical Media	Lindenberg, Kindt & Szász-Janocha (2020)	Germany (Rhine-Neckar)	Scope: School Level: Selective-Indicated Age: 12-18 years Sessions: 4 Duration: 90 min/session Facilitator: Expert psychologists Cognitive-behavioural techniques	- Reduce video game use severity, procrastination, depression, and social anxiety

The studies of the six school prevention programmes report that, after receiving the intervention, participants reduced the time spent on video games and the symptoms compatible with addiction. As for the family prevention programme (*GOI*), there was also a reduction in the time dedicated to video games and exposure to violent video games in the intervention group compared to the control group. Additionally, this reduction was maintained over time compared to the control group. However, the severity of symptoms was not affected by the intervention.

These results should be interpreted with caution, as the robustness of the studies does not allow for conclusions on the effectiveness of the programmes. Only four studies report having randomised the assignment of participants to the control and intervention groups, and only one of them reports the randomisation method used. The other three studies do not have a control group. Another important limitation is that the efficacy evaluation studies were conducted by the same authors who developed the programmes.

Knowledge of psychoeducational interventions aimed at preventing problematic video game use is still in its early stages, which does not allow for conclusions about their effectiveness. A greater number of studies with more methodological rigour are needed; with only seven interventions analysed, the evidence is insufficient to reach conclusions.

3.2 Environmental Prevention

Environmental prevention of excessive or inappropriate video game use consists of interventions that modify the context in which gaming behaviour occurs. These measures aim to raise the player's awareness of potential excessive gaming or directly limit gaming time or accessibility. Kiraly et al. (2017) reviewed 12 articles addressing the effectiveness of policies aimed at preventing problematic gaming, classified them into three main groups: (i) limiting the availability of video games, (ii) reducing the risk or harm associated with video game use, and a third group, (iii) providing services to players. The first two groups are included here as prevention strategies. The third consists of measures for people who have already developed a problematic video game use disorder, and therefore are part of treatment strategies.

To prevent excessive gaming time, systems have been developed that provide alerts or automatically shut down based on temporal information or fatigue detection. Time-based systems are triggered based on the time elapsed since the start of the game or specific time periods. A laboratory study found that the automatic shut-off system was

effective in reducing gaming time, although it produced negative emotional responses of anger and frustration, which raises doubts about its effectiveness in natural conditions (Davies & Blake, 2016).

In some Asian countries, where video game addiction has become a major public health issue, self-exclusion regulations have been implemented. For example, in South Korea, the so-called "Selective Shutdown Policy" was introduced, which limits minors' access to online games. This policy is akin to casino self-exclusion, in the sense that minors under 18 or their legal guardians can request gaming service providers to block access during pre-set hours of their choice, and game providers must comply.

Probably the best-known control strategy in video games is parental mediation. Five non-exclusive strategies that parents use have been identified: (i) active regulation, including both positive strategies (e.g., teaching methods, guidelines) and negative strategies; (ii) restrictive regulation; (iii) parental monitoring or supervision; (iv) monitoring via software; and (v) co-use, such as playing together (Gervilla et al., 2023).

Parents set limits on content or gaming time. For content control, they rely on age rating systems such as PEGI or ESRB (ESA, 1994; ISFE, 2003). For time control, they use restrictive regulation techniques.

Regarding the second block of strategies, those aimed at reducing the risks associated with video games, regulation is an effective tool to regulate the gaming context and prevent consequences. In this regard, educational communities and parents have called for improved video game labelling, making it mandatory for manufacturers, and ensuring that minors cannot purchase games for unauthorised age groups.

Another aspect that has been subject to regulation in several countries is the monetisation mechanisms in games, specifically the use of loot boxes. Xiao et al. (2022), in a specific review on the regulatory treatment of loot boxes, describes how regulations range from the least strict, leaving ethical self-regulation to the discretion of the industry, to their outright ban in countries such as Belgium and the Netherlands. Intermediate positions include Japan, which has banned a specific form of loot box called "kompu gacha", and China, which has implemented regulations requiring disclosure of prize probabilities and imposing daily purchase limits.

4. INTERNET AND SOCIAL MEDIA

In Europe, 94% of 15-year-old students report being social media users. On a typical school day, 31% spend 2-3 hours on social media, and 16% spend six or more hours. During weekends or holidays, the percentage of adolescents spending six or more hours per day on social media doubles to 31% (25% boys and 36% girls). Additionally, 46% scored 2-3 points on the self-perceived problems index related to social media use, suggesting a high risk of social media-related problems (ESPAD Group, 2019).

There is growing concern about the relationship between excessive social media use by adolescents and mental health impairment, such as sleep problems, anxiety, low self-esteem, depression, or even suicidal ideation (Ehrenreich & Underwood, 2016; Hussain & Griffiths, 2018; Richards et al., 2015; Wong et al., 2020). Social media use has also been associated with social issues, such as the likelihood of becoming a victim of cyberbullying (Fabris et al., 2020; Underwood & Ehrenreich, 2017).

Problematic Internet Use (PIU) has been defined as risky, excessive, or impulsive internet use that leads to adverse life consequences, specifically physical, emotional, social, or functional impairment. Several researchers have argued that PIU is a distinct psychiatric entity, and IA is defined as a consistent and potentially pathological behaviour pattern, characterised by salience (preoccupation with online activities), tolerance (seeking more time online to achieve satisfaction), withdrawal symptoms (when internet use is not possible), using online activities to modify mood, conflict (internal, relational, or with academic/work activities due to online engagement), and relapse (failed attempts to control behaviour) (Kuss et al., 2014). However, we still need to distinguish between dependence on the internet and dependence in the internet.

In Europe, several studies have shown worrying prevalence rates of PIU. The highest prevalence was found in England (54.9%), followed by Greece (37.7%) and Turkey (32.9%). Additionally, results indicate that countries like Italy, France, Poland, Spain, and Hungary have similar prevalence rates, at 26.4%, 24.8%, 24.5%, 23.7%, and 21.6%, respectively (Laconi et al., 2018; Tsitsika et al., 2016). Using a five-question questionnaire corresponding to the criteria for excessive internet use, the EU Kids Online 2020 survey determined that between 2% and 8% of European children experience three or four criteria for excessive internet use. The heterogeneity of instruments and differences between study samples make it difficult to accurately determine the prevalence of problematic internet use.

4.1 Prevention

Despite the intensity and extent of internet and social media use among adolescents, and the worrying prevalence of problematic use, preventive programmes whose effectiveness has been evaluated are scarce. Four systematic reviews related to empirical studies evaluating the effectiveness of IA prevention programmes have been identified. Table 3 summarises the main characteristics and findings of these reviews.

Table 3. *Systematic Reviews of Problematic Internet Use*

Title	Authors, Year	Sample	Components / Strategies	Main Results
Prevention of IA: A Systematic Review	Vondráčková & Gabrhelík, 2016	8 studies	- Information-providing versus interactive interventions - Single versus complex interventions	Only two found a significant effect in reducing problematic internet use.

Title	Authors, Year	Sample	Components / Strategies	Main Results
School-based Prevention for Adolescent IA: Prevention is the Key. A Systematic Literature Review	Throuvala, Griffiths, Rennoldson & Kuss, 2019	15 studies - 9 for IA - 6 for Multi-behaviour	- Promotion of positive psychology variables (i.e., self-esteem, self-efficacy) - Enhancement of skills and competencies to prevent IA (i.e., self-control, emotion regulation, and social interaction) - Increasing knowledge of impacts and risks (risk perception) - Using peer-to-peer training	Effectiveness measures were reported by seven studies (the rest being protocol studies), with most reporting mixed outcomes in Internet or gaming use.
Intervention Programs for the Problematic Use of the Internet and Technological Devices: A Systematic Review	Cañas & Estévez, 2021	14 studies	- Cognitive Behavioural - Educational Intervention - Positive Psychology - Multifamily Group	- Cognitive Behavioural: 2 programmes effective. - Educational Intervention: 9 showed effectiveness, one programme showed no differences. - Positive Psychology: 2 programmes effective. - Multifamily Group Therapy: 1 programme effective.
Are School-Based Interventions Effective in Preventing Internet Misuse? A Systematic Review	Martinez & Lloret, 2023	11 studies	- Improving self-control skills, self-knowledge, self-regulation - Organization of free time and daily responsibilities	All studies showed good efficacy in preventing misuse, abuse, and IA.

Vondráčková and Gabrhelík (2016) conducted two reviews. In the first narrative review, they included 100 texts that addressed the prevention of IA as a partial topic. In the second review, they analysed eight studies that focused primarily on the prevention of IA. They extracted relevant data in the following areas: (a) the country where the data was collected, (b) key characteristics of the participants (sample size and segment of the population evaluated), (c) characteristics of the intervention, (d) risk of bias in individual studies, and (e) methodological characteristics (objectives, evaluation methods, type of study, and design). Of the eight studies evaluating the effectiveness of preventive programmes, only two found a significant effect in reducing problematic internet use. A third intervention improved attitudes towards reducing internet use, but did not measure behavioural change. The authors recommend that future prevention interventions should also focus on people within the educational environment of children and adolescents at risk of IA: parents, teachers, peers, and others close to them.

Throuvala et al. (2019) reviewed 15 studies that presented high heterogeneity in terms of objectives, content, preventive load, outcome evaluations (such as IA, screen time, frequency, attitudes, habits, etc.), and evaluation tools. Of these, only seven evaluated

effectiveness. All the studies were universal prevention programmes aimed at general populations of adolescent students, except for one, which was an indicated prevention study with a protocol targeting adolescents at high risk of IA. The authors recommend: (i) using more up-to-date and psychometrically robust evaluation tools to measure effectiveness (based on the most recent empirical developments), (ii) reconsidering the reduction of internet time as the primary outcome, as this seems problematic, (iii) building methodologically sound, evidence-based prevention programmes, (iv) focusing on skills development and the use of protective and harm-reduction factors, and (v) including IA as one of the risk behaviours in multi-risk interventions.

Cañas and Estévez (2021) reviewed 14 studies that evaluated the effectiveness of several prevention programmes. Ten of the programmes were specifically aimed at preventing problematic internet use, while the other four included problematic mobile phone use, video gaming, or risky behaviours such as sexting, cyberbullying, or online gambling. The authors analysed the programmes based on their approach: two programmes were based on cognitive-behavioural therapy, nine on educational therapy, two on positive psychology, and one on multifamily therapy. All programmes, except one, showed effectiveness in various measures related to internet use and other behaviours. However, as with other reviews, the authors caution that the variety of objectives, measurement instruments, and intervention designs makes it difficult to compare the studies in terms of effectiveness.

Finally, Martínez and Lloret (2023) reviewed 11 evaluation studies, all of which showed good efficacy in preventing misuse, abuse, and internet addiction (IA). However, the heterogeneity of measures and instruments tempers the results. The objectives of the programmes were to improve self-control, self-knowledge, self-regulation, self-efficacy, and the organisation of free time and daily responsibilities, which contributed to improving the general mental health of young people. Nevertheless, the results should be interpreted with caution, as the risk of self-reporting bias is high, and only in three studies were the authors different from the designers or implementers of the programme being evaluated. Additionally, the programmes presented significant internal differences in both techniques and the number of sessions, which ranged from 4 to 64. Another consideration is the type of population, as although most target students, age differences in adolescence and gender are variables that could affect the intervention's effect. These limitations are common across all four reviews and should be taken into account in understanding the results.

5. CONCLUSIONS

Non-substance addictive behaviours are an increasing issue that require appropriate preventive interventions. In the case of problematic internet, social media, and video game use, unlike substance addictions and gambling, prevention focuses on education

for responsible use and the development of self-control skills. In the case of gambling among minors, the goal is to prevent initial episodes or, at the very least, delay the age of onset. For those minors who have already started gambling, prevention aims to curb or reduce the frequency.

To achieve these goals, various preventive strategies exist, with psychoeducational interventions in schools and families being particularly effective. In schools, programmes that combine education about risks with the development of coping and social skills have been shown to reduce misconceptions about gambling and excessive technology use. These programmes show positive cognitive effects but more limited behavioural impacts. Methodological limitations (experimental design, variability in measurement tools, sampling biases, lack of long-term follow-up, self-assessment, etc.) make it difficult to draw conclusions about their effectiveness.

On the other hand, environmental prevention strategies, such as regulating access to gambling venues or websites and restricting gambling advertising, have been effective in reducing the incidence and prevalence of gambling among minors. Regarding video games and social media, interventions focused on parental mediation and regulating usage time have shown some success in reducing excessive use.

In summary, although existing interventions have shown promising results, greater methodological rigour and long-term follow-up are needed to assess their effectiveness in preventing behavioural addictions.

REFERENCES

Adlaf, E.M. & Turner, N.T. (2004). *Schools, Students and Adolescent Gambling in Ontario: Two Studies*. Ontario Problem Gambling Research Centre

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). American Psychiatric Publishing

Barry, C. T., Sidoti, C. L., Briggs, S. M., Reiter, S. R., & Lindsey, R. A. (2017). Adolescent social media use and mental health from adolescent and parent perspectives. *Journal of Adolescence, 61*, 1-11. https://doi.org/10.1016/J.ADOLESCENCE.2017.08.005

Binde, Per (2009) Exploring the Impact of Gambling Advertising – *International Journal of Mental Health and Addiction, 7*(4): 541-554.

Binde, Per (2021) *A bibliography of empirical studies on gambling advertising*. University of Gothenburg, Sweden. Accessed in https://ongambling.org/research

Block, J. J. (2008). Issues for DSM-V: Internet addiction. American Journal of Psychiatry, 165(3), 306-307.

Boniel-Nissim M, Marino C, Galeotti T, Blinka L, Ozoliņa K, Craig W et al. (2024). *A focus on adolescent social media use and gaming in Europe, central Asia and Canada. Health Behaviour in School-aged Children international report from the 2021/2022 survey*. Volume 6. Copenhagen: WHO Regional Office for Europe; 2024: CC BY-NC-SA 3.0 IGO.

Bouguettaya, A., Lynott, D., Carter, A., Zerhouni, O., Meyer, S., Ladegaard, I.,... O'Brien, K. S. (2020). The relationship between gambling advertising and gambling attitudes, intentions and behaviours: A critical and meta-analytic review. *Current Opinion in Behavioral Sciences, 31*, 89-101. https://doi.org/10.1016/j.cobeha.2020.02.010.

Burkhart, G., Tomczyk, S., Koning, I. & Brotherhood, A. (2022) Environmental Prevention: Why Do We Need It Now and How to Advance It?. *Journal of Prevention*. https://doi.org/10.1007/s10935-022-00676-1

Calado, F., Alexandre, J. & Griffiths, M.D. (2017). Prevalence of Adolescent Problem Gambling: A Systematic Review of Recent Research. *Journal of Gambling Studies, 33*. 397-424. https://doi.org/10.1007/s10899-016-9627-5

Cañas, E. & Estévez, E. (2021) Intervention Programs for the Problematic Use of the Internet and Technological Devices: A Systematic Review. *Electronics 2021*, 10, 2923. https://doi.org/10.3390/electronics10232923

Chamarro, A., Carbonell, X., Manresa. J.M., Munoz-Miralles, R., Ortega-Gonzalez, R., Lopez-Morron, M.R., Batalla-Martinez, C. & Toran-Monserrat, P (2014) El Cuestionario de Experiencias Relacionadas con los Videojuegos (CERV): Un instrumento para detectar el uso problemático de videojuegos en adolescentes españoles. *Adicciones, 26* (4) 303-311.

Clemens, F., Hanewinkel, R., & Morgenstern, M. (2017). Exposure to gambling advertisements and gambling behavior in young people. *Journal of Gambling Studies, 33*(1), 1-13.

European Commission (2012). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A European strategy for a better internet for children. Retrieved from: https://eurlex. europa.eu/legal-content/es/TXT/?uri=CELEX:52012DC0196

Davies, B. & Blake, E. (2016). Evaluating Existing Strategies to Limit Video Game Playing Time. *IEEE Computer Graphics and Applications 36*(2):47–57. doi: 10.1109/MCG.2016.25

Derevensky, J. L., & Gilbeau, L. (2019). Preventing adolescent gambling problems. In A. Heinz, N. Romanczuk-Seiferth, y M. N. Potenza (Eds.), *Gambling disorder* (pp. 297–311). Springer Nature Switzerland AG. ttps://doi.org/10.1007/978-3-030-03060-5_14

Derevensky, J., Sklar, A., Gupta, R., & Messerlian, C. (2010). An empirical study examining the impact of gambling advertisements on adolescent gambling attitudes and behaviors.

International journal of mental health and addiction, 8, 21-34.

Dixon, R.W., Youssef, G.J., Hasking, P., Yucel, M., Jackson, A.C., & Dowling, N. A. (2016). The relationship between gambling attitudes, involvement, and problems in adolescence: examining the moderating role of coping strategies and parenting styles. *Addictive Behaviors, 58*, 42–46. doi: 10.1016/j.addbeh.2016.02.011

Dowling, N. A., Merkouris, S. S., Greenwood, C. J., Oldenhof, E., Toumbourou, J. W., & Youssef, G. J. (2017). Early risk and protective factors for problem gambling: A systematic review and meta-analysis of longitudinal studies. *Clinical psychology review, 51*, 109-124. https://doi.org/10.1016/j.cpr.2016.10.008

Dussault, F., Brendgen, M., Vitaro, F., Wanner, B. & Tremblay, R. E. (2011). Longitudinal links between impulsivity, gambling problems and depressive symptoms: a transactional model from adolescence to early adulthood. *Journal of Child Psychology and Psychiatry, 52*. 130–138

Ehrenreich, S. E. & Underwood, M. K. (2016). Adolescents' internalizing symptoms as predictors of the content of their Facebook communication and responses received from peers. *Translational Issues in Psychological Science, 2* (3), pp. 227-237.

ESPAD Group (2024). Key findings from the 2024 European School Survey Project on Alcohol and Other Drugs (ESPAD). European Union Drug Agency. Retrieved from https://www.euda.europa.eu/publications/data-factsheets/espad-2024-key-findings_en

Fabris, M. A., Marengo, D., Longobardi, C., & Settanni, M. (2020). Investigating the links between fear of missing out, social media addiction, and emotional symptoms in adolescence: The role of stress associated with neglect and negative reactions on social media. *Addictive Behaviors, 106*, 106364.

Fam J.Y. (2018). Prevalence of internet gaming disorder in adolescents: a meta-analysis across three decades. *Scandinavian Journal of Psychology, 59* (5):524-531. doi:10.1111/sjop.12459

Forsström, D., Spångberg, J., Pettersson, A., Brolund, A. & Odeberg, J. (2021). A systematic review of educational programs and consumer protection measures for gambling: an extension of previous reviews. *Addiction Research and Theory, 29*(5), 398-412. https://doi.org/10.1080/16066359.2020.1729753

Foxcroft, D. R. (2014). Can Prevention Classification be Improved by Considering the Function of Prevention? *Prevention Science, 15*(6), 818–822. https://doi.org/10.1007/s11121-013-0435-1

Gaboury, A., & Ladouceur, R. (1993). Evaluation of a prevention program for pathological gambling among adolescents. *Journal of Primary Prevention, 14*, 21–28. doi: 10.1007/BF01324653

Gervilla-García, E., Lloret-Irles, D., Cabrera-Perona, V., Fernández-Martínez, I. & Anupol, J. (2023): Online risks at adolescence. Design and validation of a Parental Mediation Scale for Information and Communication Technologies. *Journal for the Study of Education and Development, 46*(3), 492-528. DOI: 10.1080/02103702.2023.2191428

Giménez Lozano, J.M. & Morales Rodríguez, F.M. (2022). Systematic Review: Preventive Intervention to Curb the Youth Online Gambling Problem. *Sustainability, 14*, 6402. https://doi.org/10.3390/su14116402

Goldberg, I. (1996). Internet addiction disorder. *CyberPsychology Behavior, 3*(4), 403-412.

Greenberg MT. & Lippold MA. (2013). Promoting healthy outcomes among youth with multiple risks: innovative approaches. *Annual Review of Public Health, 34*. 253-70. doi: 10.1146/annurev-publhealth-031811-124619.

Griffiths, M. D. (1995). Technological addictions. *Clinical Psychology Forum, 76*, 14–19.

Griffiths, M. D., Kuss, D. J. & King, D. L. (2012). Video game addiction: past, present, and future. *Current Psychiatry Reviews 8*, pp.308-318.

Gupta, R., Nower, L., Derevensky, J. L., Blaszczynski, A., Faregh, N., y Temcheff, C. (2013). Problem gambling in adolescents: an examination of the pathways model. *Journal of Gambling Studies, 29*,575–588

Haidt, J. (2023) *The anxious generation: how the great rewiring of childhood is causing an epidemic of mental illness*. Penguin Press. New York.

Hanss, D., Mentzoni, R. A., Griffiths, M. D., & Pallesen, S. (2015). The impact of gambling advertising: Problem gamblers report stronger

impacts on involvement, knowledge, and awareness than recreational gamblers. *Psychology of addictive behaviors, 29*(2), 483–491. https://doi.org/10.1037/adb0000062

Hiller A. (2014). *Internet Gaming Disorder Fact Sheet*. American Psychiatric Association. DSM-V development. Retrieved from https://www.psychiatry.org/psychiatrists/practice/dsm/educational-resources/dsm-5-fact-sheets.

Hing, N., Cherney, L., Blaszczynski, A., Gainsbury, S.M. & Lubman, D.I. (2014) Do advertising and promotions for online gambling increase gambling consumption? An exploratory study, *International Gambling Studies, 14* (3) 394-409, DOI: 10.1080/14459795.2014.903989

Honeycutt, S., Leeman, J., McCarthy, W. J., Bastani, R., Carter-Edwards, L., Clark, H., Garney, W., Gustat, J., Hites, L., Nothwehr, F., & Kegler, M. (2015). Evaluating policy, systems, and environmental change interventions: Lessons learned from CDC's prevention research centers. *Preventing Chronic Disease, 12*(10). https://doi.org/10.5888/pcd12.150281

Hussain, Z. & Griffiths, M. D. (2018). Problematic social networking site use and comorbid psychiatric disorders: a systematic review of recent large-scale studies. *Frontiers in Psychiatry 9,* 686. doi:10.3389/fpsyt.2018.00686

Keen, B., Blaszczynski, A. & Anjoul, F. (2017). Systematic Review of Empirically Evaluated School-Based Gambling Education Programs. *Journal of Gambling Studies, 33*. 301-325. https://doi.org/10.1007/s10899-016-9641-7

Király, O., Griffiths, M. D., King, D. L., Lee, H. K., Lee, S. Y., Bányai, F., ... & Demetrovics, Z. (2018). Policy responses to problematic video game use: A systematic review of current measures and future possibilities. *Journal of behavioral addictions, 7*(3), 503-517.

Korn, D., Reynolds, J.,& Hurson, T. (2009)*Commercial Gambling Advertising: Understanding the Youth Connection*. Ontario Problem Gambling Research Centre

Kuss, D.J., Shorter, G.W., van Rooij, A.J., van de Mheen, D., & Griffiths, M.D. (2014). The Internet addiction components model and personality: Establishing construct validity via a nomological network. *Computers and Human Behaviour, 39*, 312-321. Doi: http://dx.doi.org/10.1016/j.chb.2014.07.031

Laconi, S., Kaliszewska-Czeremska, K., Gnisci, A., Sergi, I., Barke, A., Jeromin, F., ... & Kuss, D. J. (2018). Cross-cultural study of Problematic Internet Use in nine European countries. Computers in Human Behavior, 84, 430-440.

Ladouceur, R., Goulet, A. & Vitaro, F. (2013). Prevention programmes for youth gambling: a review of the empirical evidence. *International Gambling Studies, 13*, 141-159. https://doi.org/10.1080/14459795.2012.740496

Ladouceur, R., Ferland, F., & Vitaro, F. (2004). Prevention of problem gambling: Modifying misconceptions and increasing knowledge among Canadian youths. *Journal of Primary Prevention, 25*, 329–335. doi: 10.1023/B:-JOPP.0000048024.37066.32

Langhinrichsen-Rohling, J., Rohde, P., Seeley, J. R. & Rohling, M. L. (2004). Individual, family, and peer correlates of adolescent gambling. *Journal of Gambling Studies, 20*(1), 23–46.

Lemmens, J.S., Valkenburg, P.M., & Peter, J. (2019) Development and validation of a game addiction scale for adolescents. *Media Psychology, 12*. 77-95.

Lee, H. S., Lee Lemanski, J. L., & Jun, J. W. (2008). Role of gambling media exposure in influencing trajectories among college students. *Journal of Gambling Studies, 24*,25–37

Lippold, M.A. & Jensen, T.M (2017) Harnessing the strength of families to prevent social problems and promote adolescent well-being. *Children and Youth Services Review, 79*. 432-441. https://doi.org/10.1016/j.childyouth.2017.06.066

Lloret, D. & Morell R. (2016). The role of impulsiveness in videogame addiction. *Health and Addiction, 16* (1), 33-40.

Lloret, D. & Cabrera, V. (2023) Prevention in minors. In Arias. F & Orio,L. *Clinical handbook for behavioural addictions. Evidence based*. Socidrogalcohol. Barcelona.

Martínez Hernández, N. & Lloret Irles, D. (2023) D. Are school-based interventions effective in preventing Internet misuse? A systematic review. *Journal of Prevention, 45*. 193-212. https://doi.org/10.1007/s10935-023-00757-9

Mccormack, A., Shorter, G. W., Griffiths, M. D., Mccormack, A., Shorter, G. W., & Griffiths, M. D. (2014). An Empirical Study of Gender Differences in Online Gambling. *Journal of Gambling Studies, 30*, 71–88. https://doi.org/10.1007/s10899-012-9341-x

Molinaro, S., Canale, N., Vieno, A., Lenzi, M., Siciliano, V., Gori, M. & Santinello, M. (2014). Country and individual-level determinants of probable problematic gambling in adolescence: a multi-level cross-national comparison. Addiction, 109, 2089–2097 DOI:10.1111/add.12719

Monaghan, S., Derevensky, J., & Sklar, A. (2008). Impact of gambling advertisements and marketing on children and adolescents: Policy recommendations to minimise harm. *Journal of Gambling Issues, 22*, 252–274. https://doi-org.publicaciones.umh.es/10.4309/jgi.2008.22.7

Monreal-Bartolomé, A., Barceló-Soler, A.; García-Campayo, J., Bartolomé-Moreno, C., Cortés-Montávez, P., Acon, E., Huertes, M., Lacasa, V., Crespo, S., Lloret-Irles, D., et al. (2023) Preventive Gambling Programs for Adolescents and Young Adults: A Systematic Review. *International Journal for Enviromental Research and Public Health, 20*, 4691. https://doi.org/10.3390/ijerph20064691

Newall, P. W. S., Moodie, C., & Reith, G., et al. (2019). Gambling marketing from 2014 to 2018: A literature review. *Current Addiction Reports, 6*. 49–56. https://doi.org/10.1007/s40429-019-00239-1

Oh, B.C., Ong, Y.J. & Loo, J.M.Y. (2017). A review of educational-based gambling prevention programs for adolescents. *Asian Journal of Gambling Issues & Public Health, 7*(1):4. https://doi.org/ 10.1186/s40405-017-0024-5.

Oncioiu, S. I., Burkhart, G., Calafat, A., Duch, M., Perman-Howe, P., & Foxcroft, D. R. (2018*). Environmental substance use prevention interventions in Europe*. European Monitoring Centre for Drugs and Drug Addiction: Lisbon, Portugal.

Potenza, M.N., Wareham, J.D., Steinberg, M.A., Rugle, L., Vavallo, D.A., Krishnan-Sarin, S. & Desai, R.A. (2011). Correlates of at-risk/problem internet gambling in adolescents. *Journal of the American Academy of Child and Adolescence Psychiatry, 50* (2), 150-159.

Richards, D., Caldwell, P. H. & Go, H. (2015). 'Impact of social media on the health of children and young people. *Journal of Paediatrics and Child Health, 51* (12), pp. 1152-1157

Salvarli, S. I. & Griffiths, M. D. (2019). The association between internet gaming disorder and impulsivity: a systematic review of literature, *International Journal of Mental Health and Addiction*, doi:10.1007/s11469-019-00126-w.

Scott, H., & Woods, H. C. (2018). Fear of missing out and sleep: Cognitive behavioural factors in adolescents' nighttime social media use. *Journal of Adolescence, 68*, 61-65. https://doi.org/10.1016/J.ADOLESCENCE.2018.07.009

Secades-Villa, R., Calafat, A., Fernández-Hermida, J. R., Juan, M., Duch, M., Skärstrand, E., & Talic, S. (2014). Duration of Internet use and adverse psychosocial effects among European adolescents. *Adicciones, 26*(3), 247–53.

Smahel, D., Machackova, H., Mascheroni, G., Dedkova, L., Staksrud, E., Ólafsson, K., Livingstone, S., & Hasebrink, U. (2020). *EU Kids Online 2020: Survey results from 19 countries*. EU Kids Online. Doi: 10.21953/lse.47fdeqj010fo

Stanger, C., Dumenci, L., Kamon, J. & Burstein, M. (2004). Parenting and children's externalizing problems in substance-abusing families. *Journal of Clinical Child and Adolescent Psychology, 33* (3), 590-600.

Stevens, M., Dorstyn, D., Delfabbro, PH. & King, DL. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry, 55* (6), 553-568.

Stockdale, L. & Coyne, S. M. (2018). Video game addiction in emerging adulthood: cross-sectional evidence of pathology in video game addicts as compared to matched healthy controls. *Journal of Affective Disorders, 225*. 265-272, doi:10.1016/j.jad.2017.08.045.

St-Pierre, R., Walker, D. Derevensky, J.& Gupta, R. (2014). How Availability and Accessibility of Gambling Venues Influence Problem Gambling: A Review of the Literature. *Gaming law review and economics, 18* (2).doi: 10.1089/glre.2014.1824

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.

Tejeiro, R. & Bersabé, R. (2002). Measuring Problem Video Game Playing in Adolescents. *Addiction, 97*, 1601-1606.

Throuvala, M. A., Griffiths, M. D., Rennoldson, M., & Kuss, D. J. (2019). School-based Prevention for Adolescent Internet Addiction: Prevention is the Key. A Systematic Literature Review. *Current neuropharmacology, 17*(6), 507–525. https://doi.org/10.2174/1570159X16666180813153806

Underwood, M. K., & Ehrenreich, S. E. (2017). The power and the pain of adolescents' digital communication: Cyber victimization and the perils of lurking. *American Psychologist, 72*(2), 144.

van den Eijnden, R., Koning, I., Doornwaard, S., van Gurp, F. and TerBogt, T. (2018). The impact of heavy and disordered use of games and social media on adolescents' psychological, social, and school functioning. *Journal of Behavioral Addictions, 7* (3). 697-706. doi:10.1556/2006.7.2018.65.

Vondráčková, P., & Gabrhelík, R. (2016). Prevention of Internet addiction: A systematic review. *Journal of Behavioral Addictions, 5*(4), 568–579.

Welte, J. W., Barnes, G. M., Tidwell, M. C. O., Hoffman, J. H., & Wieczorek, W. F. (2016). The relationship between distance from gambling venues and gambling participation and problem gambling among US adults. *Journal of Gambling Studies, 32*, 1055-1063.

World Health Organization. (2019). International classification of diseases for mortality and morbidity statistics (11th Revision). https://icd.who.int/

Wolfers, L., & Karsay, K. (2024) The Smartphone as Physical Object. Advancing The Debate on Problematic Smartphone Use. In von Pape, Y. & Karnowski, V. *The Mobile Media Debate. Challenging Viewpoints Across Epistemologies* (1st ed.). Routledge. https://doi.org/10.4324/9781003312963

Wong, H. Y., Mo, H. Y., Potenza, M. N., Chan, M. N. M, Lau, W. M., Chui,T. K., Pakpour, A. H. & Lin, C.-Y. (2020). Relationships between severity of internet gaming disorder, severity of problematic social media use, sleep quality and psychological distress. *International Journal of Environmental Research and Public Health, 17* (6), p. 1879.

Xiao, L.Y., Henderson,L.L., Nielsen,R.K.L., & Newall, P. (2022). Regulating Gambling-Like Video Game Loot Boxes: A Public Health Framework Comparing Industry Self-Regulation, Existing National Legal Approaches, and Other Potential Approaches. *Current Addiction Reports 9*(3):163–78. doi: 10.1007/s40429-022-00424-9.

Young K. S. (1996) Psychology of Computer Use: XL. Addictive use of the Internet: a case that breaks the stereotype. *Psychological Reports, 79*, 899–902.

Young ,M., Markham F. & Doran, B. (2012) Too close to home? The relationships between residential distance to venue and gambling outcomes. International *Gambling Studies, 12*:2, 257-273, DOI:10.1080/14459795.2012.664159

16

PREVENTION PROGRAMS OF BEHAVIORAL ADDICTIONS IN SCHOOLS AND FAMILIES IN SPAIN AND LATIN AMERICA

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ABSTRACT:

The development of Relational, Information, and Communication Technologies (RICTs) and their widespread use among minors have sparked growing interest, particularly concerning problematic Internet use, online gambling, and gaming disorder. These issues have been incorporated into public policies focusing on prevention in adolescents. Our objective was to review school- and family-based prevention programs addressing problematic Internet use, online gambling, and gaming disorder evaluated in Spain and Latin America, identifying their main characteristics. In Spain, school prevention programs targeting behavioral addictions are scarce compared to those aimed at preventing substance abuse. These programs are based on theoretical models related to the etiology of the problem, employ active methodologies, and are implemented by trained professionals. In Latin America, school prevention programs are primarily general health-promotion initiatives, which include reducing screen time among adolescents. No evaluated family prevention programs were identified in either Spain or Latin America. However, research highlights effective parenting strategies to reduce problematic screen use in minors. Most of these interventions combine Positive Parenting and Digital Parenting approaches, emphasizing family communication, setting limits, and digital literacy. Evidence-based prevention of problematic Internet use and online addictive behaviors, in both school and family contexts, remains a challenge in Spain and Latin America. Further studies are required to confirm the effectiveness of school prevention programs and to develop and validate family-based programs. Establishing quality standards for the design and evaluation of prevention programs is also critical.

KEYWORDS:

school prevention, family prevention, problematic Internet use, problematic gambling, gaming disorder

1. SCHOOL AND FAMILY PREVENTION OF NON-SUBSTANCE ADDICTIONS

The development of Relational, Information, and Communication Technologies (RICTs) (Gabelas-Barroso & Marta-Lazo, 2020) has sparked increasing interest in research on the Internet and its potential role as a catalyst for problematic or addictive behaviors (Fontana et al., 2023), particularly those related to gambling and video game addiction (Bjørseth et al., 2021; Cañas & Estévez, 2021; Cudo et al., 2018). Both Gambling Disorder (American Psychiatric Association, 2013; World Health Organization, 2019) and Gaming Disorder (World Health Organization, 2019) have been recognized by the scientific community as behavioral addictions. However, Internet use has not yet been classified as such and continues to generate controversy among researchers (Kaess et al., 2021; Rumpf et al., 2019; Starcevic & Aboujaoude, 2017). Nevertheless, there is some consensus that Internet use can become problematic (Fernandes et al., 2019; Rial et al., 2015).

Screen use has become integrated into daily life, particularly among minors, creating associated risks (Browne et al., 2021; Kuss et al., 2014). Social concern about these issues has led to their inclusion in the development of public policies, such as the National Strategy on Addictions 2017–2024 (Government Delegation for the National Plan on Drugs, 2017). Over the last decade, prevention has played a prominent role in actions to be implemented, especially regarding the adolescent population. This line of action has primarily been focused on the school context, which allows for reaching many adolescents in an enabling environment (Fonseca-Pedrero et al., 2023). Furthermore, this approach has been shown to be effective (Throuvala et al., 2019) and highly cost-effective (Deogan et al., 2015).

Prevention, as a scientific and professional discipline, is defined as the systematic study of interventions aimed at reducing maladaptive behaviors and promoting adaptive behaviors across various areas such as family, health, education, and community (The Science for Prevention Academic Network [SPAN], 2024).

Evidence on school-based prevention programs addressing problematic Internet use (PIU), gaming, and gambling indicates that their effectiveness should be supported by an adequate theoretical conceptualization (Keen et al., 2017), the use of reinforcement sessions (Ren et al., 2019), community participation (Cañas & Estévez, 2021), and behavioral evaluations with follow-up (Monreal-Bartolomé et al., 2023). Internationally, several universal prevention programs have been designed to address these problems by promoting psychosocial skills, knowledge of risks, and the reduction of associated symptoms (Fumero et al., 2021; Throuvala et al., 2019). Evidence-supported school programs addressing these issues include the PROTECT program (Lindenberg et al., 2022), the PATHS program (Shek & Sun, 2011), the BEST Teen Program (Shek et al., 2016), and the Cyberhero Mobile Safety educational platform (Hswen et al., 2014).

The family plays a fundamental role in promoting healthy technology use (Lukavská et al., 2022), acting as regulators of screen use (mobile phones, Internet, video games). However, while family strategies have shown promise, research on their effectiveness remains limited. Studies in this field have focused on identifying effective parenting strategies to prevent problematic screen use. Family involvement in preventive interventions has been shown to be effective, as demonstrated by Apisitwasana et al. (2018), who evaluated a school- and family-based program in which families played a crucial role in maintaining program consistency, finding improvements in children's self-regulatory behaviors.

Kalischuk et al. (2006) emphasize that factors such as genetic predispositions and learned behaviors from parents are significant in the onset of gambling problems. Akçayır et al. (2022), in their review, highlight the importance of family education in raising parental awareness about the risks of pathological gambling. Family dynamics can also influence the development of problematic behaviors. In this regard, McComb and Sabiston (2010) suggest that parental modeling impacts children, increasing their risk of gambling disorder. Additionally, family emotional support is associated with protection against these behaviors (Vachon et al., 2004). According to Dowling et al. (2016), families with dysfunctional dynamics, marked by lack of cohesion and frequent conflicts, may exacerbate gambling problems in adolescents. Conversely, those fostering open communication and providing emotional support help reduce the risk of gambling disorder in youth (Dowling et al., 2016).

Moreover, combining Positive Parenting and Digital Parenting approaches, focused on communication and setting limits, has been associated with the reduction of problematic behaviors (Benedetto & Ingrassia, 2020). The concept of Digital Parenting refers to parental practices for regulating and supervising minors' access to technology and digital media (Modecki et al., 2022). However, no single approach is universally applicable to all families.

Additionally, the gaming industry poses a significant challenge to the effectiveness of prevention programs, as the industry itself often funds initiatives implemented in schools, which typically fail to adequately address associated risks (van Schalkwyk et

al., 2022). This further underscores the necessity of including gambling prevention in family programs, as noted by Williams et al. (2012).

2. SCHOOL-BASED PREVENTION OF BEHAVIORAL ADDICTIONS

2.1 School Prevention Programs in Spain

In Spain, there are numerous school programs aimed at preventing substance use, although not all have demonstrated their efficacy (Medina-Martínez & Villanueva-Blasco, 2023; Villanueva-Blasco et al., 2024). However, specific programs to prevent PIU, gambling disorder, and gaming disorder are scarce. This imbalance reflects a disparity between the magnitude of the problem, the resulting social and health concerns, and the limited availability of preventive programs. Below, we present a table summarizing the main characteristics of those school-based programs targeting PIU and online addictive behaviors implemented in Spain, which currently have evidence supporting their effectiveness. Afterwards, the specifications of each of them are detailed.

Table 1. *Prevention programs in Spain*

Program	Behaviours addressed	Target population	Prevention type	Duration / sessions	Implementers
¿QTJ? – ¿Qué te juegas? [What do you bet?]	Gambling among adolescents; reducing pro-gambling beliefs, intention to gamble, and cognitive biases	14–17 years old (Secondary)	Universal	4 sessions of 50 minutes	Psychologists specialized in addictions
Ludens	Problem gambling and gambling disorder throughout the life cycle	Adolescents up to >65 years old	Universal and selective	2 sessions	Prevention specialists (psychologists)
Cubilete [Dice cup]	Problematic Internet use (PIU) and online gaming	Adolescents	Universal	4 sessions	Psychologists specialized in addictions
Safety.net	PIU, video games, nomophobia and other online risks (grooming, cybervictimization)	11–14 years old	Universal	16 sessions	Teaching staff after 30 hours of training
PrevTec 3.1 – Video games section	Problematic use and possible addiction to video games; impulse control	9–16 years old	Universal	3 sessions	Psychologists and psychology students
Tú Decides [Decide yourself]	Use of legal and illegal drugs and problematic use of the Internet/social media (1 session)	11–19 years old	Universal	6 sessions (1 on Internet and Social Networks) + 4 sessions for parents	Teaching staff after 14 hours of training

Program	Theoretical models and key components	Evidence of efficacy
¿QTJ? – ¿Qué te juegas? [What do you bet?]	Based on planned action theory, cognitive and social learning models; presentations, debates, and group dynamics; work on advertising and social pressure	Small-moderate significant effects on risk perception and self-efficacy to refrain from gambling; decreased intention to gamble and illusion of control; higher perceived risk and lower illusion of control than the control group
Ludens	Biopsychosocial approach and principles of ethical gambling; audiovisual content; information on types of gamblers, effects on mental health, and economic interests in the sector; guidelines for avoiding problem gambling	Reduction in participation in traditional and online gambling and in the risk of gambling disorder, with a small effect size
Cubilete [Dice cup]	Practical methodology with information, videos, and participatory activities; education on the risks of excessive ICT use and symptoms of problematic gaming; recommendations for appropriate use and alternative leisure activities	Significant results: lower spending on gambling and technology; greater awareness of technological dependence
Safety.net	Based on planned action theory, social co-construction model, etc.; informational sessions + group activities; development of digital skills; emphasis on relational and dysfunctional risks; family component: information and guidelines on video game use, setting schedules, and alternative leisure activities	Two evaluations: small-moderate effects on PIU and nomophobia; reduction in grooming and cyber victimization in the experimental group; no effects on gambling disorder
PrevTec 3.1 – Video games section	No explicit theoretical model; audiovisual resources + group and individual tasks; guidelines on schedules, alternative leisure activities, parental supervision, and impulse control techniques; family component: information for parents on risks and setting limits	Significant effects in groups that received additional impulse control techniques: lower frequency and dependence on video games; greater long-term effects
Tú Decides [Decide yourself]	Based on health belief models and decision-making models; work on social influences and healthy alternatives; strong family component (4 sessions) to reinforce norms and coping skills	Evaluated for substance use (effectiveness in that area); no specific evidence on effectiveness in PIU or online addictions

2.1.1 *Program ¿QTJ? - ¿Qué Te Juegas?*

¿QTJ? - ¿Qué te juegas? [What do you bet?] (Lloret-Irles & Cabrera-Perona, 2019) focuses on gambling problems among adolescents aged 14 to 17. This universal prevention program is based on the theory of planned behavior, cognitive models, and social learning theory, aiming to modify attitudes toward problematic gambling. It comprises four 50-minute sessions employing lectures, debates, and group dynamics to facilitate learning. The program is delivered by psychologists specialized in addictions, ensuring professional intervention. The main objectives include reducing pro-gambling beliefs,

raising awareness of gambling consequences, identifying cognitive biases, and promoting critical thinking about gambling advertisements. The program seeks to equip adolescents with tools to resist social pressure and make informed decisions. In their evaluation, Lloret-Irles and Cabrera-Perona (2019) found small-to-moderate significant effects on risk perception and self-efficacy to avoid gambling, as well as a reduction in gambling intentions and illusions of control. The experimental group exhibited higher risk perception and lower illusions of control compared to the control group.

2.1.2 *Program LUDENS*

The *Ludens* program (Chóliz et al., 2022) targets a broad age range, from adolescents to individuals over 65. Classified as both universal and selective prevention, it is grounded in a biopsychosocial approach and the principles of ethical gambling. The program consists of two sessions that use audiovisual content to facilitate understanding of gambling-related issues. The program is delivered by prevention specialists such as psychologists. It focuses on informing participants about different types of gamblers and the impact on mental health, raising awareness of the economic interests of the gambling sector. Additionally, it provides action guidelines to avoid problematic gambling, empowering participants to make healthier decisions. In their evaluation, Chóliz et al. (2022) reported small but significant effects. After the intervention, a reduction was observed in participation in traditional and online gambling, as well as in the risk of developing a gambling disorder.

2.1.3 *Program CUBILETE*

The *Cubilete* [Dice Cup] program (Berrios et al., 2020) addresses PIU and online gambling among adolescents. As a universal prevention program, it employs practical methodologies, including four sessions featuring informational content, videos, and participatory activities. The program is delivered by psychologists specialized in addictions, who create a safe environment for participants. The main objectives include raising awareness of the risks of excessive use of ICTs and symptoms of gambling disorder. Additionally, it provides recommendations for healthy Internet use and alternative leisure activities, helping adolescents recognize signs of potential addiction. In their evaluation, Berrios et al. (2020) found statistically significant results, including reduced spending on gambling and technology, as well as increased awareness of technological dependence.

2.1.4 *Program SAFETY.NET*

Safety.net (Ortega-Barón et al., 2021) is designed to prevent problems related to Internet use and video games among adolescents aged 11 to 14. This universal prevention program is based on the theory of planned behavior and the social co-construction model, among others. It consists of 16 sessions combining informational lectures and group activities. The program is delivered by teachers who receive 30 hours of training. It aims to develop digital skills, raise awareness of Internet risks, and promote attitudinal

change among adolescents. The program focuses on relational and dysfunctional risks, fostering skills that help participants address digital environment dangers.

The *Safety.net* program was evaluated in two studies. In the first study, Ortega-Barón et al. (2021) found small-to-moderate significant effects on PIU and nomophobia, although not on gambling disorder. In the second study (Ortega-Barón et al., 2024), significant results were also reported for PIU and nomophobia, as well as grooming and cyberbullying, with the experimental group achieving lower scores compared to the control group.

2.1.5 *Program PREVTEC 3.1 - Video Game Module*

PrevTec 3.1 (Marco & Chóliz, 2017) addresses problematic video game use among students aged 9 to 16. Classified as a universal prevention program, it does not follow a specific theoretical model and consists of three sessions combining audiovisual resources with group and individual tasks. The program is delivered by psychologists and psychology students working together to facilitate the intervention. The main components include guidelines for video game usage schedules and promoting alternative leisure activities. It also emphasizes parental supervision and techniques for impulse control, equipping students with tools to manage their time and decisions related to video games. In their evaluation (Marco & Chóliz, 2017), significant results were found in experimental groups that received additional impulse control techniques. Moreover, lower frequency and dependence on video game use were observed, with long-term effects being more pronounced in the group that included the additional techniques.

2.1.6 *Program TÚ DECIDES*

The *Tú Decides* [Decide yourself] program (Calafat et al., 1995) addresses alcohol, tobacco, and illegal drug use, as well as PIU. Aimed at adolescents aged 11 to 19, it is classified as a universal prevention program. It is based on various theoretical models, such as the health belief model and decision-making theory. The program comprises six sessions, one of which focuses on Internet use and social networks, along with four sessions for parents. It is delivered by teachers who undergo 14 hours of training. The objectives include raising awareness of social influences, promoting alternatives to substance use, and empowering adolescents to resist pressures and make informed decisions about their health. Evaluations of the *Tú Decides* program have focused on substance use, but not on PIU, and thus, its efficacy for this issue remains unproven.

2.2 School Prevention Programs in Latin America

Latin America is characterized by great cultural, economic, social, and linguistic diversity, which limits the ability to make broad generalizations. Nevertheless, the region is experiencing an increase in technology users, especially among individuals from lower social classes (Martínez et al., 2020). This growth also leads to a higher prevalence

of PIU, gambling disorder, and gaming disorder, highlighting the need to implement preventive practices in this area (Rojas-Díaz & Yepes-Londoño, 2022).

The search for evaluated school-based prevention programs addressing online addictive behaviors in Latin America yielded no results. Consequently, the search was broadened to include school prevention programs implemented in the region that have some objective related to the problematic issues mentioned, such as reducing screen time (computer, video games, smartphone, etc.), given the lack of specific evidence on PIU/gaming disorder/gambling disorder, and currently have evidence of their effectiveness. The programs identified under these criteria are presented below.

The term *screen time* is used as an umbrella term that encompasses different types of use of audiovisual and digital devices. However, it is important to distinguish between: (a) passive audiovisual consumption, mainly television and content platforms; (b) non-recreational interactive use, such as the use of computers, tablets, or smartphones for academic tasks, information searches, or communication; and (c) recreational and potentially addictive interactive use, which includes time spent on video games, social media, and online gambling. From the perspective of behavioral addiction prevention, this third category is particularly relevant. Therefore, for each program, the specific type of screen use that has been evaluated is indicated.

Table 2. *Prevention programs in Latin America*

Program	Country	Behaviours addressed	Target population	Prevention type	Duration / structure	Implementers
Saúde na Boa [Good Health] Project	Brazil	Reducing excessive screen time as part of promoting physical activity and healthy eating	Secondary school, ages 15–24	Universal	9 months; educational interventions + environmental changes	Physical Education (PE) Teachers (trained)
ACTIVITAL Program	Ecuador	Reducing screen time (TV, computer, video games) and improving other health habits	Ages 12–15	Universal	2 school years; Course 1: 5 biweekly 90-minute sessions (1 on screens); Course 2: 8 sessions (no focus on screens)	Teaching staff and specialized personnel
Mexa-se – De mãos dadas pela saúde [Get moving - Hand in hand for health]	Brazil	Reducing excessive screen time as part of healthy habits (physical activity, diet, self-image)	6th to 9th grade, (10–16 years old)	Universal	11 weeks	Physical Education (PE) teachers (trained and pedagogically supported)

Program	Country	Behaviours addressed	Target population	Prevention type	Duration / structure	Implementers
School Health Promotion Program	Peru	Reducing excessive screen time as part of a comprehensive school health program	Secondary school, ages 11–20	Universal	No number of sessions specified; continued programme	Multidisciplinary team (psychologists, nurses, nutritionists, social workers) with support from experts in health education
Fortaleça sua Saúde [Strengthen your health] program	Brazil	Reducing excessive screen time and promoting physical activity and healthy habits	7th to 9th grade, (11–18 years old)	Universal	4 months	Physical Education (PE) teachers + university students
Movimente [Move] program	Brazil	Reducing screen time and sedentary lifestyles	7th to 9th grade (Secondary school)	Universal	1 school year	Research team in collaboration with teaching staff
Digital Citizenship program	Peru	Promoting healthy use of digital media: digital wellbeing, privacy, cyberbullying, digital literacy, online emotional regulation, sleep, etc.	6th to 9th grade	Universal	9 one-hour sessions	Teaching staff (after training)

Program	Theoretical models and key components	Evidence of efficacy
Saúde na Boa [Good Health] Project	Based on the transtheoretical model; Health Promoting Schools approach and Centers for Disease Control and Prevention (CDC) guidelines; Food and Physical Activity Day, newsletters, bicycle parking, healthy snack day, PE kit, active leisure activities at the weekend; structural school component (not family-specific)	It was not effective in reducing screen time among students
ACTIVITAL Program	Based on social cognitive theory, the information-motivation-behavior model, control theory, planned behavior theory, and the transtheoretical model; comprehensive participatory planning and evaluation (CPPE); individual and environmental strategies; family component: 1-hour workshop per course for parents	In Course 1, screen time (especially TV) is reduced; in Course 2, as it does not specifically address screens, the effect is not maintained

Program	Theoretical models and key components	Evidence of efficacy
Mexa-se – De mãos dadas pela saúde [Get moving - Hand in hand for health]	Based on cognitive-social theory and Health Promoting Schools; adapted PE classes, debates, workshops, creation of materials by students; family component: teaching materials for families.	Significant reduction in excessive screen use during the week in the intervention group (computer and video games in males; TV in females), but no significant global differences between the intervention and control groups in terms of excessive screen time
School Health Promotion Program	Health education (nutrition, physical activity, mental health, substances, sexual health); individual psychological counseling for high-risk individuals; health checkups; workshops for parents and families on healthy habits	Excessive screen time does not decrease significantly in the intervention group, but it does increase in the control group (containment effect)
Fortaleça sua Saúde [Strengthen your health] program	Based on socioecological theory, sociocognitive theory, and Health Promoting Schools; general training for all teachers and specific training for physical education teachers; two sessions of supervised physical activity, playground games, banners, health promotion and substance prevention sessions; family component: informational brochures for parents on physical activity, screens, and healthy habits	Significant reduction in screen time in the intervention group; also significant decrease in TV time in the control group
Movimente [Move] program	Based on social cognitive theory, socioecological frameworks, and school health promotion; teacher training (manuals and online support), educational curriculum with bimonthly materials, improvement of sports facilities, and provision of equipment	No significant effects on the overall reduction in screen time; however, there was a reduction of ≈40 minutes/week in TV time among 8th-grade students.
Digital Citizenship program	Cultural adaptation of the Common Sense Digital Citizenship program; 6 original components (digital life balance, privacy, digital footprint, relationships, cyberbullying/hate speech, news and digital literacy) + 3 (online emotional regulation, online conflict resolution, sleep habits); structured educational methodology	No significant differences at baseline between the control and intervention groups in screen time or social media use; slight tendency toward more positive online experiences in the intervention group; more students in the intervention group report not receiving help with digital dilemmas

2.2.1 *SAÚDE NA BOA project*

The *Saúde na Boa* [Good Health] Project, implemented in Brazil by Menêses et al. (2014), aims to reduce excessive screen time (two or more hours per day watching television or playing videogames/using the computer on weekdays or weekend days) among high school students (aged 15–24) through a universal school-based prevention approach. The program was based on the transtheoretical model of behavior change, integrating

constructs such as decisional balance and self-efficacy. It aligned with the philosophy of the World Health Organization's Health-Promoting Schools initiative and the guidelines of the Centers for Disease Control and Prevention (Nahas et al., 2009). The methodology included educational interventions and changes in the school environment, such as celebrating Nutrition and Physical Activity Day, distributing newsletters, installing bike racks, implementing a weekly Healthy Snack Day, providing materials to make physical education classes more appealing, and organizing active leisure activities on weekends. The program spans nine months and actively involves physical education teachers, who receive training to adapt the curriculum. The evaluation (Menêses et al., 2014) showed that the program was not effective in reducing excessive screen time among students.

2.2.2 *ACTIVITAL program*

The ACTIVITAL program, implemented in Ecuador by Andrade et al. (2015), was designed to reduce screen time (minutes per day watching television, or playing videogames or using the computer on weekdays or weekend days) among adolescents aged 12–15, among other objectives. Framed as a universal school-based preventive intervention, the program is grounded in social cognitive theory, the information-motivation-behavioral skills model, control theory, planned behavior theory, and the transtheoretical model. It employs the Comprehensive Participatory Planning and Evaluation (CPPE) approach (Andrade et al., 2014). The program includes individual and environmental strategies applied in two intervention stages (over two consecutive academic years). During the first year, five biweekly sessions of 90 minutes were conducted, one of which specifically addressed excessive screen time, including TV, computers, and video games. In the second year, eight sessions were delivered, but none directly addressed screen time. The program is implemented by teachers and specialized personnel. The evaluation results (Andrade et al., 2015) showed that after the first stage, the program successfully reduced screen time, particularly TV use, when the strategies specifically targeted these behaviors. However, after the second stage, the lack of specific strategies for reducing screen time led to no observable impact.

2.2.3 *MEXA-SE – DE MÃOS DADAS PELA SAÚDE program*

The *Mexa-se – De mãos dadas pela saúde* [Get moving - Hand in hand for health] program (Vieira et al., 2018) was implemented in Brazil, with one of its objectives being to reduce excessive screen time (two or more hours per day watching television or playing videogames/using the computer on weekdays or weekend days) among students aged 10–16. Framed as a universal preventive strategy, the program promotes healthy lifestyles among children and adolescents. Based on social cognitive theory and the health-promoting schools model, it employs a diverse methodology, including adapted physical education classes, group discussions, workshops, and the creation of informational materials by students themselves. Key components include promoting physical activity, positive self-image, healthy eating, and healthy lifestyle habits to combat

sedentary behaviors. The program lasts 11 weeks and is delivered by physical education teachers who receive training and pedagogical support. The evaluation (Vieira et al., 2018) showed a significant reduction in excessive screen use in the intervention group during weekdays (Monday–Friday), specifically in computer and video game use among boys and TV viewing among girls. However, no significant differences in excessive screen time were found between the intervention and control groups.

2.2.4 *SCHOOL HEALTH PROMOTION PROGRAM*

The School Health Promotion Program (Sharma et al., 2018), implemented in Peru, was designed, among other objectives, to reduce excessive screen time (two or more hours per day watching television or playing videogames or using the Internet) among secondary school students aged 11–20. This universal school-based prevention intervention combines health education, screening, psychological counseling, and environmental changes. Strategies include health education for students on topics such as nutrition, physical activity, mental health, substance use, and sexual health; individual psychological counseling sessions for high-risk students; health checkups covering nutrition, oral health, mental health, and vision; and workshops to engage parents in promoting healthy habits. The program is implemented by a multidisciplinary team comprising psychologists, nurses, nutritionists, and social workers, with support from health education experts. The evaluation (Sharma et al., 2018) found that although excessive screen time did not significantly decrease in the intervention group, it increased in the control group, suggesting a containment effect.

2.2.5 *FORTALEÇA SUA SAÚDE Program*

The *Fortaleça sua Saúde* [Strengthen your health] program was developed in Brazil to reduce excessive screen time (watching TV or using a computer/video games for two or more hours a day) among adolescents aged 11–18, among other objectives. This universal school-based prevention intervention is grounded in socio-ecological theory, social cognitive theory, and the Health-Promoting Schools approach. The program includes general training for all teachers and specific training for physical education teachers. Key activities include supervised physical activity sessions, schoolyard games, educational banners, health promotion and substance use prevention sessions, and the distribution of brochures on physical activity, screen time, and healthy habits. The program runs for four months and primarily involves active collaboration with physical education teachers and university physical education students. Its evaluation (Barbosa et al., 2019) demonstrated a significant reduction in screen time in the intervention group (TV and computer/video games), along with a significant decrease in TV viewing time in the control group.

2.2.6 *MOVIMENTE Program*

The *Movimente* [Move] program (dos Santos et al., 2021), developed in Brazil, aims to reduce screen time (daily minutes of device specific screen time [TV, computer, video games and smartphone]) among adolescents in grades 7–9. Classified as a universal school-based preventive intervention, it is based on social cognitive theory, socio-ecological frameworks, and school health promotion. The program includes teacher training and the creation of a school environment that encourages physical activity and reduces sedentary behavior. The main activities include: a) teacher training through a manual (a general manual for all teachers and specific ones for physical education teachers by grade level) with activity proposals and online support; b) an educational curriculum distributing posters and folders with bimonthly content related to sedentary behavior, physical activity, and its impact on academic performance; and c) improvements to the school environment, such as revitalizing sports areas and providing sports equipment to encourage exercise. The program lasts one academic year and is implemented by the research team in collaboration with teachers. The evaluation (dos Santos et al., 2021) did not find significant effects in reducing overall screen use (TV, video games, computers, smartphones) when comparing the global sample. The only statistically significant intervention effect found was on reducing TV time (by almost 40 min per week) among 8th grade students only.

2.2.7 *DIGITAL CITIZENSHIP Program*

The Digital Citizenship program (Magis-Weinberg et al., 2023), implemented in Peru, aims to promote healthy digital media use among adolescents. The intervention targets students in grades 6–9 and is implemented in schools as a universal prevention approach. The program is a translation and cultural adaptation of the Common Sense Digital Citizenship Program (James et al., 2021), originally developed in the United States. Six original components of the program (balancing digital life and well-being; privacy and security; digital footprint and identity; relationships and communication; cyberbullying, digital drama, and hate speech; and news and digital literacy) were supplemented with three additional components (online emotional regulation; online conflict resolution; and sleep habits related to technology use). The program uses a methodology based on nine structured, one-hour educational sessions delivered by trained teachers. Its evaluation (Magis-Weinberg et al., 2023) found no significant differences in screen time (hours of TV viewing, computer use, video games or smartphone during the weekend) or social media use intensity between the intervention and control groups at baseline. However, a slight trend was observed in the intervention group toward increased positive online experiences. Nonetheless, more students in the intervention group reported not receiving help to resolve digital dilemmas compared to the control group.

3. FAMILY-BASED PREVENTION OF NON-SUBSTANCE ADDICTIONS

Despite efforts to identify family prevention programs in Spain and Latin America using the same criteria as for school prevention programs, findings revealed the absence of specific programs targeting families. However, some school-based prevention programs previously discussed incorporate family-oriented components. In Spain, the *Safety.net* and *PrevTec 3.1* programs, which address video game use, include family-focused components such as understanding the risks of video game overuse, setting schedules and alternative leisure activities, involving parents, and teaching impulse control techniques. Both programs effectively reduced the time spent on online video games.

In Latin America, the ACTIVITAL program implemented in Ecuador (Andrade et al., 2015) includes a family component consisting of a one-hour workshop for parents in each course. Similarly, the School Health Promotion Program conducted in Peru (Sharma et al., 2018) offers workshops for parents as well as joint sessions for students and their families. In Brazil, the *Mexa-se – De mãos dadas pela saúde* program (Vieira et al., 2018) provides didactic materials for families, while the *Fortaleça sua Saúde* program offers informational brochures for parents (Barbosa et al., 2019).

4. COMPONENTS OF FAMILY-BASED PREVENTION OF NON-SUBSTANCE ADDICTIONS

Evidence-based Digital Parenting strategies are crucial in preventing PIU, gambling disorder and gaming disorder among adolescents. The most supported strategies include effective communication, setting limits, and active supervision.

4.1 Communication and Setting Limits

According to Schneider et al. (2017), poor relationships between parents and children are associated with more severe video game use problems, whereas a positive bond acts as a protective factor. Therefore, families must maintain open and effective communication, allowing members to interact clearly, respectfully, and constructively. This type of communication not only strengthens family relationships but also contributes to everyone's emotional well-being.

Key elements of effective family communication include:

1. Openness: Family members feel comfortable expressing thoughts and feelings without fear of judgment.
2. Clarity: Information is communicated directly and comprehensibly, with language adapted to the recipient's developmental level.
3. Respect: Consideration is shown for each member's opinions, avoiding offensive language and promoting active listening.

4. Empathy: Efforts are made to understand and validate others' emotions, creating a supportive environment without giving in to manipulation.
5. Active Listening: Full attention is given, asking questions and reflecting back what has been heard to ensure understanding.
6. Conflict Resolution: Conflicts are addressed constructively, seeking mutually satisfactory solutions.
7. Cooperation: Teamwork is encouraged to achieve common goals.
8. Consistency: Effective communication should be a consistent pattern, not an isolated event.

4.2 Active Supervision

Active supervision is defined as the proactive monitoring of children's activities and relationships, particularly their screen use. Gentile et al. (2017) found that increased parental supervision is associated with a lower risk of problematic screen use. This supervision enables parents to provide guidance, support, and safety, helping to prevent exposure to inappropriate content.

Active supervision can be implemented through several strategies:

1. Regular Monitoring: Parents review their children's online activities, including the content they consume and the apps they use. Parental control applications can facilitate this task by limiting online time or access to inappropriate content.
2. Active Participation: Engaging in children's online activities, such as playing video games or exploring educational apps, fosters an environment of trust and connection.
3. Online Safety Education: Parents teach their children safe practices, such as not sharing personal information and recognizing online harassment.
4. Adherence to Age-Appropriate Guidelines: Parents ensure their children access content suitable for their development by following age classification recommendations.
5. Evaluation of Apps and Games: Parents should inform themselves and evaluate the applications and video games their children wish to use, verifying their appropriateness and content.

5. CONCLUSIONS

The prevention of behavioral addictions, such as PIU, gambling disorder, and gaming disorder, in school and family contexts, remains a developing area, in Spain and particularly in Latin America.

In Spain, school-based prevention programs are relatively scarce and are mostly based on theoretical models centered on the etiology of addictive behaviors, employing active and participatory methodologies implemented by trained professionals. Programs such

as *Cubilete*, *¿Qué te juegas?*, and *Ludens* have demonstrated effectiveness in reducing PIU, gambling, and video game addiction among adolescents.

In Latin America, programs are generally characterized by a broad focus on promoting healthy habits, including reducing screen time, but they do not necessarily address behavioral addictions specifically. In other words, they incorporate screen time (television, computer, video games, smartphone, internet, etc.) as a relevant indicator within a broader approach to lifestyles and sedentary behavior. However, none of them specifically assess gambling disorder, PIU, or gaming disorder, so their results should be interpreted with caution when considering online addictive behaviors. Programs such as *Mexa-se*, *ACTIVITAL*, and *Fortaleça sua Saúde* have achieved certain reductions in screen use among adolescents, although the impact of *ACTIVITAL* was limited to the first year. Other programs, such as *Movimente*, showed more modest reductions in excessive screen use. The *Digital Citizenship* program increased positive social experiences online. In general, very modest reductions in total screen time or in some specific devices (television, computer, video games) are observed, but there is still a clear evidence gap regarding interventions developed in Latin America explicitly targeting PIU, gambling disorder, or gaming disorder.

Furthermore, there is significant disparity in the availability of preventive programs across countries, with such programs identified in only three nations —Brazil, Peru, and Ecuador. This suggests that the feasibility of implementing evidence-based school prevention programs targeting online addictive behaviors in Latin America is currently very limited. This gap contrasts with programs developed in Spain, where there are experiences that have been specifically evaluated in gambling, PIU, and gaming, opening the door to adapting and/or developing similar programs in Latin America.

Family interventions are limited in both regions, although some programs include components aimed at involving parents in regulating and controlling minors' use of technology. Research in the family domain highlights the importance of communication, setting limits, and promoting Digital Parenting practices to mitigate the risks of problematic use of digital technologies.

Future research should confirm the effectiveness of school prevention programs currently being implemented and focus on developing and validating family-based programs. In this regard, establishing quality standards for both the design and evaluation of prevention programs is essential.

REFERENCES

Akçayır, M., Nicoll, F., Baxter, D. G., & Palmer, Z. S. (2022). Whose Responsibility Is It to Prevent or Reduce Gambling Harm? A Mapping Review of Current Empirical Research. *International Journal of Mental Health and Addiction*, *20*(3), 1516–1536. https://doi.org/10.1007/s11469-020-00459-x

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders. Fifth edition*. American Psychiatric Publishing.

Andrade, S., Lachat, C., Ochoa-Aviles, A., Verstraeten, R., Huybregts, L., Roberfroid, D., Andrade, D., Camp, J. Van, Rojas, R., Donoso, S., Cardon, G., & Kolsteren, P. (2014). A school-based intervention improves physical fitness in Ecuadorian adolescents: A cluster-randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity*, *11*, Article 153. https://doi.org/10.1186/s12966-014-0153-5

Andrade, S., Verloigne, M., Cardon, G., Kolsteren, P., Ochoa-Avilés, A., Verstraeten, R., Donoso, S., & Lachat, C. (2015). School-based intervention on healthy behaviour among Ecuadorian adolescents: Effect of a cluster-randomized controlled trial on screen-time. *BMC Public Health*, *15*(1), Article 942. https://doi.org/10.1186/s12889-015-2274-4

Apisitwasana, N., Perngparn, U., & Cottler, L. B. (2018). Effectiveness of school- and family-based interventions to prevent gaming addiction among grades 4-5 students in Bangkok, Thailand. *Psychology Research and Behavior Management*, *11*, 103–115. https://doi.org/10.2147/PRBM.S145868

Barbosa, V. C., Bandeira, A. da S., Minatto, G., Linard, J. G., Aragoni, J., Martins, R., Wolker, S., Mendes, S. A., Sousa, T., & Samara, K. (2019). Effect of a multicomponent intervention on lifestyle factors among brazilian adolescents from low human development index areas: A cluster-randomized controlled trial. *International Journal of Environmental Research and Public Health*, *16*(2), Article 267. https://doi.org/10.3390/ijerph16020267

Benedetto, L., & Ingrassia, M. (2020). Digital Parenting: Raising and Protecting Children in Media World. In L. Benedetto & M. Ingrassia (Eds.), *Parenting - Studies by an Ecocultural and Transactional Perspective*. IntechOpen. https://doi.org/10.5772/intechopen.92579

Berrios, B., Pérez, B., Sánchez, F., & Pantoja, A. (2020). Análisis del programa educativo "Cubilete" para la prevención de adicciones a TIC en adolescentes. Caso específico de juegos de azar y apuestas online [Analysis of the "Cubilete" educational program for the prevention of ICT addictions in adolescents. Specific case of gambling and online betting]. *Revista Española de Orientación y Psicopedagogía*, *31*(1), 26–42.

Bjørseth, B., Simensen, J. O., Bjørnethun, A., Griffiths, M. D., Erevik, E. K., Leino, T., & Pallesen, S. (2021). The effects of responsible gambling pop-up messages on gambling behaviors and cognitions: A systematic review and meta-analysis. *Frontiers in Psychiatry*, *11*, Article 601800. https://doi.org/10.3389/fpsyt.2020.601800

Browne, D. T., May, S. S., Colucci, L., Hurst-Della Pietra, P., Christakis, D., Asamoah, T., Hale, L., Delrahim-Howlett, K., Emond, J. A., Fiks, A. G., Madigan, S., Perlman, G., Rumpf, H. J., Thompson, D., Uzzo, S., Stapleton, J., Neville, R., & Prime, H. (2021). From screen time to the digital level of analysis: A scoping review of measures for digital media use in children and adolescents. *BMJ Open*, *11*, Article e046367. https://doi.org/10.1136/bmjopen-2020-046367

Calafat, A., Amengual, M., Guimerans, C., Rodríguez-Martos, A., & Ruiz, R. (1995). "Tú decides": 10 años de un programa de prevención escolar [Decide Yourself: 10 years of the school-based prevention progam]. *Adicciones*, *7*(4), 509–526. http://www.irefrea.eu/uploads/PDF/Calafat%20et%20al_1995_Tu%20Decides_10%20años.pdf

Cañas, E., & Estévez, E. (2021). Intervention programs for the problematic use of the internet and technological devices: A systematic review. *Electronics*, *10*(23), Article 2923. https://doi.org/10.3390/electronics10232923

Chóliz, M., Marcos, M., & Bueno, F. (2022). Ludens: A Gambling Addiction Prevention Program Based on the Principles of Ethical Gambling. *Journal of Gambling Studies*, *38*(3), 993–1008. https://doi.org/10.1007/s10899-021-10066-7

Cudo, A., Kopiś, N., Stróżak, P., & Zapała, D. (2018). Problematic video gaming and problematic internet use among Polish young adults. *Cyberpsychology, Behavior, and Social Networking*, *21*(8), 523–529. https://doi.org/10.1089/cyber.2018.0014

Deogan, C., Zarabi, N., Stenström, N., Högberg, P., Skärstrand, E., Manrique-Garcia, E., Neovius, K., & Månsdotter, A. (2015). Cost-Effectiveness of School-Based Prevention of Cannabis Use. *Applied Health Economics and Health Policy*, *13*(5), 525–542. https://doi.org/10.1007/s40258-015-0175-4

dos Santos, P. C., Salmon, J., Arundell, L., Veber, M. V., & Samara, K. (2021). Effectiveness and moderators of a multicomponent school-based intervention on screen time devices: the Movimente cluster-randomized controlled trial. *BMC Public Health*, *21*(1), Article 1852. https://doi.org/10.1186/s12889-021-11895-2

Dowling, N. A., Suomi, A., Jackson, A. C., & Lavis, T. (2016). Problem Gambling Family Impacts: Development of the Problem Gambling Family Impact Scale. *Journal of Gambling Studies*, *32*(3), 935–955. https://doi.org/10.1007/S10899-015-9582-6

Fernandes, B., Maia, B. R., & Pontes, H. M. (2019). Internet addiction or problematic internet use? Which term should be used? *Psicologia USP*, *30,* Article e190020. https://doi.org/10.1590/0103-6564E190020

Fonseca-Pedrero, E., Díez-Gómez, A., Pérez-Albéniz, A., Lucas-Molina, B., Al-Halabí, S., & Calvo, P. (2023). Psychology professionals in educational contexts: An unavoidable necessity. *Papeles del Psicólogo*, *44*(3), 112–124. https://doi.org/10.23923/pap.psicol.3018

Fontana, A., Benzi, I. M. A., & Cipresso, P. (2023). Problematic internet use as a moderator between personality dimensions and internalizing and externalizing symptoms in adolescence. *Current Psychology*, *42*(22), 19419–19428. https://doi.org/10.1007/s12144-021-02409-9

Fumero, A. A., Marrero, R. J., de Miguel, A., & Peñate, W. (2021). Tratamientos psicológicos para las adicciones comportamentales en población infanto-juvenil [Psychological treatments for behavioral addictions in children and adolescents]. In E. Fonseca-Pedrero (Ed.), *Manual de tratamientos psicológicos: infancia y adolescencia* (pp. 699–730). Pirámide.

Gabelas-Barroso, J. A., & Marta-Lazo, C. (2020). *La era TRIC: Factor R-elacional y educomunicación* [The RICT era: R-relational factor and educommunication]. Ediciones Egregius.

Gentile, D. A., Bailey, K., Bavelier, D., Brockmyer, J. F., Cash, H., Coyne, S. M., Doan, A., Grant, D. S., Green, C. S., Griffiths, M., Markle, T., Petry, N. M., Prot, S., Rae, C. D., Rehbein, F., Rich, M., Sullivan, D., Woolley, E., & Young, K. (2017). Internet Gaming Disorder in Children and Adolescents. *Pediatrics*, *140*(s2), Article e20161758.

Government Delegation for the National Plan on Drugs. (2017). *National Strategy on Addictions 2017-2024*.

Hswen, Y., Rubenzahl, L., & Bickham, D. S. (2014). Feasibility of an online and mobile videogame curriculum for teaching children safe and healthy cellphone and internet behaviors. *Games for Health Journal*, *3*(4), 252–259. https://doi.org/10.1089/g4h.2013.0074

James, C., Weinstein, E., & Mendoza, K. (2021). *Teaching Digital Citizens in Today's World: Research and Insights Behind the Common Sense K-12 Digital Citizenship Curriculum. Version 2*. www.commonsense.org/education

Kaess, M., Klar, J., Kindler, J., Parzer, P., Brunner, R., Carli, V., Sarchiapone, M., Hoven, C. W., Apter, A., Balazs, J., Barzilay, S., Bobes, J., Cozman, D., Gomboc, V., Haring, C., Kahn, J. P., Keeley, H., Meszaros, G., Musa, G. J., … Wasserman, D. (2021). Excessive and pathological Internet use – Risk-behavior or

psychopathology? *Addictive Behaviors*, *123*, Article 107045. https://doi.org/10.1016/j.addbeh.2021.107045

Kalischuk, R. G., Nowatzki, N., Cardwell, K., Klein, K., & Solowoniuk, J. (2006). Problem Gambling and its Impact on Families: A Literature Review. *International Gambling Studies*, *6*(1), 31–60. https://doi.org/10.1080/14459790600644176

Keen, B., Blaszczynski, A., & Anjoul, F. (2017). Systematic Review of empirically evaluated school-based gambling education programs. *Journal of Gambling Studies*, *33*, 301–325. https://doi.org/10.1007/s10899-016-9641-7

Kuss, D. J., Griffiths, M. D., Karila, L., & Billieux, J. (2014). Internet Addiction: A Systematic Review of Epidemiological Research for the Last Decade. *Current Pharmaceutical Design*, *20*, 4026–4052. https://doi.org/10.2174/13816128113199990617

Lindenberg, K., Kindt, S., & Szász-Janocha, C. (2022). Effectiveness of Cognitive Behavioral Therapy-based intervention in preventing gaming disorder and unspecified Internet Use Disorder in adolescents: A cluster randomized clinical trial. *JAMA Network Open*, *5*(2), Article e2148995. https://doi.org/10.1001/jamanetworkopen.2021.48995

Lloret-Irles, D., & Cabrera-Perona, V. (2019). Prevención del juego de apuestas en adolescentes: ensayo piloto de la eficacia de un programa escolar [Prevention of adolescent gambling: A pilot efficacy trial in school setting]. *Revista de Psicología Clínica con Niños y Adolescentes*, *6*(3), 55–61. https://doi.org/10.21134/rpcna.2019.06.2.1

Lukavská, K., Hrabec, O., Lukavský, J., Demetrovics, Z., & Király, O. (2022). The associations of adolescent problematic internet use with parenting: A meta-analysis. *Addictive Behaviors*, *135*, Article 107423. https://doi.org/10.1016/J.ADDBEH.2022.107423

Magis-Weinberg, L., Muñoz, D. E., Gys, C. L., Berger, E. L., & Dahl, R. E. (2023). Short Research Article: Promoting digital citizenship through a school-based intervention in early adolescence in Perú (a pilot quasi-experimental study). *Child and Adolescent Mental Health*, *28*(1), 83–89. https://doi.org/10.1111/camh.12625

Marco, C., & Chóliz, M. (2017). Eficacia de las técnicas de control de la impulsividad en la prevención de la adicción a videojuegos [Effectiveness of impulsivity control techniques to videogame addiction prevention]. *Terapia Psicológica*, *35*(1), 57–69.

Martínez, R., Palma, A., & Velásquez, A. (2020). *Revolución tecnológica e inclusión social: reflexiones sobre desafíos y oportunidades para la política social en América Latina* [Technological revolution and social inclusión Reflect on challenges and opportunities for social policy in Latin America]. Comisión Económica para América Latina y el Caribe (CEPAL).

McComb, J. L., & Sabiston, C. M. (2010). Family influences on adolescent gambling behavior: A review of the literature. *Journal of Gambling Studies*, *26*(4), 503–520. https://doi.org/10.1007/s10899-010-9181-5

Medina-Martínez, J., & Villanueva-Blasco, V. J. (2023). Prevention Versus Pseudo-prevention: a Systematic Review of School Drug Prevention and its Indexing in Best Practice Portals. *International Journal of Mental Health and Addiction, 23,* 443-473. https://doi.org/10.1007/s11469-023-01122-x

Menêses, C., Gomes, M. V., da Silva, A., Antunes, R., Bezerra, J., & Vinicius, M. (2014). Effectiveness of a school-based intervention regarding screen time in high school students. *Revista Brasileira de Cineantropometria e Desempenho Humano*, *16*(Suppl. 1), 25–35. https://doi.org/10.5007/1980-0037.2014v16s1p25

Modecki, K. L., Goldberg, R. E., Wisniewski, P., & Orben, A. (2022). What is digital parenting? A systematic review of past measurement and blueprint for the future. *Perspectives on Psychological Science*, *17*, 1673–1691. https://doi.org/10.1177/17456916211072458

Monreal-Bartolomé, A., Barceló-Soler, A., García-Campayo, J., Bartolomé-Moreno, C., Cortés-Montávez, P., Acon, E., Huertes, M., Lacasa, V., Crespo, S., Lloret-Irles, D., Sordo, L., Clotas Bote, C., Puigcorbé, S., & López-Del-Hoyo, Y. (2023). Preventive gambling programs for adolescents and young adults:

A systematic review. *International Journal of Environmental Research and Public Health*, *20*(6), Article 4691. https://doi.org/10.3390/ijerph20064691

Nahas, Ma. V, de Barros, M. V., de Assis, M. A. A., Hallal, P. C., Florindo, A. A., & Konrad, L. (2009). Methods and participant characteristics of a randomized intervention to promote physical activity and healthy eating among brazilian high school students: the Saude na Boa project. *Journal of Physical Activity and Health*, *6*(2), 153–162. https://doi.org/10.1123/jpah.6.2.153

Ortega-Barón, J., González-Cabrera, J., Machimbarrena, J. M., & Montiel, I. (2021). Safety.Net: A pilot study on a multi-risk internet prevention program. *International Journal of Environmental Research and Public Health*, *18*, Article 4249. https://doi.org/10.3390/ijerph18084249

Ortega-Barón, J., Machimbarrena, J. M., Díaz-López, A., Caba-Machado, V., Tejero, B., & González-Cabrera, J. (2024). Efficacy of a multi-risk internet prevention program: Safety.net. *Revista de Psicodidactica*, *29*(2), 97–106. https://doi.org/10.1016/j.psicod.2024.01.004

Ren, J., Moberg, K., Scuffham, H., Guan, D., & Asche, C. V. (2019). Long-term effectiveness of a gambling intervention program among children in central Illinois. *PLoS ONE*, *14*(2), Article e0212087. https://doi.org/10.1371/journal.pone.0212087

Rial, A., Gómez, P., Isorna, M., Araujo, M., & Varela, J. (2015). PIUS-a: Problematic Internet Use Scale in adolescents. Development and psychometric validation. *Adicciones*, *27*, 47–63.

Rojas-Díaz, J. S., & Yepes-Londoño, J. J. (2022). Panorama de riesgos por el uso de la tecnología en América Latina [Overview of risks caused by the use of technology in Latin America]. *Trilogía Ciencia Tecnología Sociedad*, *14*(26), Article e2020. https://doi.org/10.22430/21457778.2020

Rumpf, H. J., Brandt, D., Demetrovics, Z., Billieux, J., Carragher, N., Brand, M., Bowden-Jones, H., Rahimi-Movaghar, A., Assanangkornchai, S., Glavak-Tkalic, R., Borges, G., Lee, H. K., Rehbein, F., Fineberg, N. A., Mann, K., Potenza, M. N., Stein, D. J., Higuchi, S., King, D., … Poznyak, V. (2019). Epidemiological Challenges in the Study of Behavioral Addictions: a Call for High Standard Methodologies. *Current Addiction Reports*, *6*(3), 331–337. https://doi.org/10.1007/s40429-019-00262-2

Schneider, L. A., King, D. L., & Delfabbro, P. H. (2017). Family factors in adolescent problematic Internet gaming: A systematic review. *Journal of Behavioral Addictions*, *6*(3), 321–333. https://doi.org/10.1556/2006.6.2017.035

Sharma, B., Kim, H. Y., & Nam, E. W. (2018). Effects of School-based Health Promotion Intervention on Health Behaviors among School Adolescents in North Lima and Callao, Peru. *Journal of Lifestyle Medicine*, *8*(2), 60–71. https://doi.org/10.15280/jlm.2018.8.2.60

Shek, D. T. L., & Sun, R. C. F. (2011). Evaluation of positive youth development programs that help secondary 2 students with greater psychosocial needs. In *Public health yearbook, 2009*. (pp. 387–402). Nova Biomedical Books.

Shek, D. T. L., Yu, L., Leung, H., Wu, F. K. Y., & Law, M. Y. M. (2016). Development, implementation, and evaluation of a multi-addiction prevention program for primary school students in Hong Kong: the B.E.S.T. Teen Program. *Asian Journal of Gambling Issues and Public Health*, *6*(1), Article 5. https://doi.org/10.1186/s40405-016-0014-z

Starcevic, V., & Aboujaoude, E. (2017). Internet addiction: Reappraisal of an increasingly inadequate concept. *CNS Spectrums*, *22*(1), 7–13. https://doi.org/10.1017/S1092852915000863

The Science for Prevention Academic Network (SPAN). (2024). *https://euspr.org/span/*

Throuvala, M. A., Griffiths, M. D., Rennoldson, M., & Kuss, D. J. (2019). School-based Prevention for Adolescent Internet Addiction: Prevention is the Key. A Systematic Literature Review. *Current Neuropharmacology*, *17*(6), 507–525. https://doi.org/10.2174/1570159x16666180813153806

Vachon, J., Vitaro, F., Wanner, B., & Tremblay, R. E. (2004). Adolescent gambling: relationships with parent gambling and parenting practices. *Psychology of Addictive Behaviors*,

18(4), 398–401. https://psycnet.apa.org/record/2004-21853-014

van Schalkwyk, M. C. I., Hawkins, B., & Petticrew, M. (2022). The politics and fantasy of the gambling education discourse: An analysis of gambling industry-funded youth education programmes in the United Kingdom. *SSM - Population Health*, *18,* Article 101122. https://doi.org/10.1016/j.ssmph.2022.101122

Vieira, J. A. J., Augustemak, L. R., Santos, D. A., & Petroski, E. L. (2018). Effectiveness of a multicomponent intervention on the screen time of Brazilian adolescents: Non-randomized controlled study. *Motriz. Revista de Educacao Fisica*, *24*(3), Article e0046_18. https://doi.org/10.1590/S1980-6574201800003E0046-18

Villanueva-Blasco, V. J., Medina-Martínez, J., & Zaragoza, J. (2025). Systematic review on the characteristics and efficacy of school preventive programs for drug addiction in Spain. *Adicciones*, *37*(1), 19-40. https://doi.org/10.20882/adicciones.1966

Williams, R. J., West, B. L., & Simpson, R. I. (2012). *Prevention of problem gambling: A comprehensive review of the evidence and identified best practices*. http://hdl.handle.net/10133/751

World Health Organization. (2019). *International Classification of Diseases 11th Revision*.

17

GOOD PRACTICES AND EVIDENCE-BASED RECOMMENDATIONS IN NON-SUBSTANCE ADDICTIONS IN SPAIN

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ABSTRACT:

The so-called behavioural addictions or non-substance addictions have been recognised in the scientific literature for years, but only recently, and to a very limited extent, have they appeared in psychiatric classifications. Addiction is considered to be a chronic disease of the brain's reinforcement and motivational system, characterised by the pathological search of reinforcing behaviour and the seeking of relief from discomfort during abstinence. Currently, there is growing concern about these addictions due to the emergence of new technologies and an evident problem in dealing with their correct use for many people. In current psychiatric classifications (DSM-5 and ICD-11), pathological gambling is recognised as an addictive disorder due to clinical and etiopathogenic similarities with other drug addictions. Many other behaviours (i.e. sex, food intake, shopping) are susceptible to inducing addictive disorders, but their recognition as clinical entities by nosological systems is often difficult. Video game addiction is considered as a condition that requires further research for its possible inclusion in the DSM-5, although it is currently recognised in the ICD-11. Internet addiction (not online gaming) was proposed as such more than 30 years ago; however, it has not yet been consolidated as a specific clinical condition. The DSM-5 notes that there is no evidence for sex addiction, exercise addiction or shopping addiction. Therefore, all these potentially problematic behaviours are subject to important questions about their consideration as disorders under the risk of pathologizing everyday life. In recent years, increasing emphasis has been placed on evaluating possible behavioural addictions, both from a preventive (universal, selective and indicated) and healthcare point of view. However, there are still few publications that bring together the scientific knowledge generated to date in an integrated manner, giving visibility to the evidence or analysing the quality of the scientific results.

KEYWORDS:

nosology, treatment, prevention, epidemiology, diagnosis, evidence, behavioural addictions

1. INTRODUCTION

Socidrogalcohol, together with the participation of specialised researchers and clinicians from Spain, has developed an evidence-based clinical guideline to clarify the epidemiological, nosological, preventive and therapeutic aspects of behavioural addictions or problematic behaviours. This chapter summarises the evidence extracted from each section of the guideline (Arias & Orio (Coord.). *Evidence-based Clinical Guideline on Behavioral Addictions,* Socidrogalcohol: https://socidrogalcohol.org/wp-content/uploads/2024/02/Guia_Adicciones_Comportamentales_completa-1.pdf).

In this section, the therapies are described and analysed using the levels of scientific evidence and grades of recommendation from SIGN (Scottish Intercollegiate Guidelines Network) (see Table 1).

Table 1. *Levels of scientific evidence and grades of recommendation.*

Levels of Scientific Evidence	
1++	Meta-analyses (MA), high-quality systematic reviews (SR), or high-quality clinical trials with very low risk of bias.
1+	Well-conducted MAs, SRs, or well-conducted clinical trials with low risk of bias.
1-	MAs, SRs, or clinical trials with high risk of bias.
2++	High-quality SRs of cohort or case-control studies. Cohort or case-control studies with very low risk of bias and high probability of establishing a causal relationship.
2+	Well-conducted cohort or case-control studies with low risk of bias and moderate probability of establishing a causal relationship.
2-	Cohort or case-control studies with high risk of bias and significant risk that the relationship is not causal.
3	Non-analytical studies, such as case reports and case series.
4	Expert opinion.

Grades of Recommendation	
A	At least one MA, SR, or clinical trial classified as 1++ and directly applicable to the target population of the guideline; or a body of evidence consisting of studies classified as 1+ with great consistency among them.
B	A body of evidence consisting of studies classified as 2++, directly applicable to the target population of the guideline and demonstrating great consistency among them; or evidence extrapolated from studies classified as 1++ or 1+.
C	A volume of scientific evidence composed of studies classified as 2+ directly applicable to the guideline's target population and demonstrating high consistency between them; or scientific evidence extrapolated from studies classified as 2++.
D	Evidence of level 3 or 4; or evidence extrapolated from studies classified as 2+.

Note: Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

2. NOSOLOGY OF BEHAVIOURAL ADDICTIONS

A behavioural addiction is any repetitive behaviour that is pleasurable, at least in the early stages, and which leads to a loss of control (more due to the type of relationship established by the individual than the behaviour itself), with serious interference in their daily life, whether at a familial, occupational, or social levels. In all of them, the fundamental defining aspect is not so much the frequency with which they are performed (which, incidentally, is usually high) but the psychological dependence and the negative consequences. These two characteristics are fundamental because, on the one hand, they allow the presence of a behavioural addiction to be distinguished from the mere high frequency of a particular behaviour and, on the other hand, they prevent the mistake of psychopathologizing everyday life.

Although there may be numerous behaviours that can lead to addiction, only two behavioural addictions are recognised in the fifth revision of the Diagnostic and Statistical Manual (DSM-5) and in the International Classification of Diseases (ICD-11). In the previous version, the DSM-IV-TR (American Psychiatric Association, 2002), gambling disorder was included in the category of impulse control disorders. In the DSM-5, it is categorised under Substance Related and Addictive Disorders. ICD-11 in Chapter 6 includes Mental, Behavioural and Neurodevelopmental disorders (World Health Organisation, 2019). This section includes Disorders due to Substance Use or Addictive Behaviours. Among the disorders due to addictive behaviours, it includes gambling disorder and video game use disorder (gaming disorder). Video Game Addiction in DSM-5 is referred to as 'Internet Gaming Disorder (IGD)' and the ICD-11 uses the term 'Gaming Disorder'. This phenomenon can be considered emergent in the sense that its inclusion in the DSM-5 and ICD-11 has driven its research, but much remains to be understood as the necessary consensus has not yet been reached.

In relation to the challenges involved in diagnosing video game addiction, the guideline highlights the following conclusions:

- *Evolution*. We are at the beginnings of a possible disorder in constant evolution, which generates both controversy and consensus. Video games are evolving, and this evolution is supported by a powerful industry. For example, the mechanics and structural characteristics of games such as *PONG*, *Pokemon Go*, *Call of Duty* or *World of Warcraft* are very different and it is unknown how virtual reality and artificial intelligence will alter the behaviour of video gamers.
- *Severity of symptoms and time invested*. There is an obvious risk of pathologizing everyday life and millions of video gamers worldwide. The severity of symptoms must be considered, so the social, physical and psychological consequences need to be severe. The time spent playing is not as important as the negative consequences that can arise, but the time dedicated to playing prevents the development of other activities and can have physical, psychological, and social consequences. Neither the ICD-11 nor the DSM-5 use the time spent playing as a diagnostic criterion.
- *Age of the affected population*. There is a risk of applying adult criteria to adolescents and children and not using criteria truly relevant for detecting this symptomatology in adolescents, since the diagnostic criteria of the ICD-11 and DSM-5 are designed for adults, despite the vast majority of those seeking help for this problem are relatives of adolescents. Another challenge related to the age is the stability of the disorder. While in the case of adults the 12 months required for diagnosis are useful to distinguish a mental disorder from a transient discomfort, in children and adolescents this period may be too long. It is difficult to precisely establish in adolescents and young people what constitutes a social, excessive, problematic, and addictive player.
- *Cultural context and social adaptation*. Some Asian countries are more prone to diagnosing young people immersed in video games because their societies have a stricter view of time wastage and academic performance than Western countries.
- *Economic consequences*. Besides pathological gambling and video game addiction (gambling and gaming disorders), other possible behaviours have been proposed that have the risk of becoming addictive. The study of these possible addictions is based on Griffiths' (2005) model: mood modification, tolerance, withdrawal, conflict, and relapse. Griffiths' model has been criticised for not considering the severity of physical and psychological consequences and for some terminological confusion between disorder and other states. A second major source of criticism comes from the lack of rigour in the construction of tests and diagnostic scales.

These potential addictions can tentatively be classified into five major groups:

a. Pathological gambling, face-to-face and online;

b. Digital or technological addictions: video games (gaming), mobile, internet (general and specific), social networks, 'screens';
c. Somatic addictions linked to bodily functions: sex (pornography, hypersexuality), eating and/or food, physical exercise;
d. Social or personal addictions: emotional dependence, dependence on psychological manipulation groups, love addiction;
e. Others: tanorexia, work, shopping (and many others).

Sex addiction is the subject of heated debate. The editors of the DSM-5 initially considered including sex addiction in the latest edition, but ultimately it was not included, due to a perceived lack of scientific evidence. Shopping addiction is another unrecognised behavioural addiction that have attracted the attention of researchers, since it easily takes on the characteristics of other behavioural addictions, such as preoccupation, focus, as well as compulsivity and loss of control. For most people, shopping is a routine part of daily activities; however, for some people, shopping turns into a chronic, excessive, and repetitive behaviour that induces temporary euphoria or provides relief from negative emotions and, in the long term, can have adverse consequences. Therefore, shopping addiction, is becoming an increasingly important research topic in this field, especially online shopping.

3. EVIDENCE OF PHARMACOLOGICAL TREATMENTS FOR THESE ADDICTIONS

Different pharmacological treatments for behavioural addictions have been recommended, especially for pathological gambling (Table 2). Pallesen et al. (2007) conducted a meta-analysis and found evidence for the use of antidepressants, opioid antagonists, mood stabilisers, with no differences in the outcomes achieved by these three classes of pharmacological interventions. Additionally, Dowling et al. (2022) published a systematic review examining the efficacy of the main categories of pharmacological interventions (antidepressants, opioid antagonists, mood stabilisers, atypical antipsychotics) for gambling disorders or problems. The results were as follows: antidepressants and mood stabilisers were not more effective than placebo after treatment, opioid antagonists showed a medium beneficial treatment effect on the severity of gambling symptoms compared to placebo, the atypical antipsychotic olanzapine had a medium beneficial treatment effect on the severity of gambling symptoms compared to placebo. In comparative effectiveness, antidepressants were not more effective than opioid antagonists on depressive or anxiety symptoms, nor were antidepressants more effective than mood stabilisers on depressive or anxiety symptoms after treatment.

The meta-analysis published in 2019 by Goslar et al. provide a comprehensive assessment of the short- and long-term efficacy of pharmacological and combined treatments

in pathological gambling. These pharmacological treatments were associated with large and medium pre-post reductions in overall severity, frequency, and financial losses. The controlled effect sizes for outcome variables were robust for short-term reductions in overall severity. Among the placebo-controlled studies, results showed that opioid antagonists and mood stabilisers, particularly topiramate combined with a cognitive intervention and lithium for gamblers with bipolar disorder, demonstrated promising results. However, large-scale, more rigorously designed randomised controlled trials with prolonged initial placebo periods are needed. Additionally, future studies need to monitor concurrent psychosocial treatments, the type of comorbidity, use equivalent measurement tools, and provide follow-up data.

Through a systematic review, Kraus et al. (2020) evaluated the findings of 19 randomised controlled trials that tested pharmacotherapies for the treatment of pathological gambling. Opioid antagonists such as naltrexone showed promise in the treatment of this disorder. Nalmefene also showed encouraging results. Pharmacological treatment combined with psychotherapy may provide better patient retention percentages compared to pharmacological treatments alone.

A recent review evaluates opioid receptor antagonists (e.g., naltrexone and nalmefene), serotonin reuptake inhibitors, glutamatergic agents (e.g., N-acetylcysteine [NAC], acamprosate, and memantine), mood stabilizers (e.g., topiramate, carbamazepine, lithium), and other medications (e.g., modafinil, nefazodone, olanzapine, haloperidol, tolcapone, and bupropion). They conclude that it is difficult to draw firm conclusions regarding the optimal choice of pharmacotherapy. Although some medications, such as naltrexone and nalmefene, show promising results, their effectiveness has varied across studies. The review highlights current limitations such as small sample sizes, high placebo response rates, and lack of longer-term information (Mestre & Potenza, 2024).

Table 2. *Summary of the evidence on pharmacological treatments available for the treatment of pathological gambling.*

Results	Grade of Recommendation
Currently there is not enough evidence to recommend any pharmacological treatment for pathological gambling.	B
Antidepressants as a group are not more effective than placebo in treating the severity of pathological gambling symptoms.	C
Opioid antagonists may have a beneficial effect on the severity of gambling symptoms.	B
Mood stabilisers as a group have not been found effective in reducing the severity of gambling symptoms, nor in reducing associated depressive and anxiety symptoms.	C
The atypical antipsychotic olanzapine may be effective in reducing the severity of gambling symptoms.	C
The atypical antipsychotic aripiprazole may be a risk factor due to its partial dopamine agonist mechanism.	B

Results	Grade of Recommendation
Antidepressants do not appear to be more effective than opioid antagonists on depressive symptoms or anxiety symptoms.	D
Antidepressants have not been found to be more effective than mood stabilisers for depressive or anxiety symptoms.	D

Note: Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

For video game addiction, bupropion has shown effectiveness in certain studies. Additionally, the use of naltrexone is showing promising results in the treatment of behavioural addictions not only for gambling, but also for compulsive shopping and internet addiction. Regarding internet addiction, studies with Selective Serotonin Reuptake Inhibitors (SSRIs) suggest potential benefits, although research remains limited. SSRIs have shown efficacy in treating internet addiction with associated sexual addiction. In some studies, escitalopram has been noted to reduce craving and improve mood, similar to the outcomes observed with sertraline in pathological gambling via internet platforms. Additionally, fluvoxamine, carbamazepine, and even lithium suggest potential for reducing the urge to engage in problematic behaviours (Table 3). Similarly, small effect sizes, possible publication biases, and the limited quality of published studies restrict the ability to draw conclusions (Danielsen et., 2024), as do the high heterogeneity across studies, short follow-up periods, and inconsistency in diagnostic criteria. Therefore, more studies are needed on pharmacological treatments for this condition (Harpas et al., 2025).

Table 3. *Summary of the evidence on pharmacological treatments available for the treatment of addiction to new technologies.*

Results	Grade of Recommendation
Currently there is insufficient evidence to recommend any pharmacological treatment for technology addiction.	B
Antidepressants as a group are no more effective than placebo in treating the severity of technology addiction symptoms.	B
Opioid antagonists may have a beneficial effect on the severity of technology addiction symptoms.	B
Mood stabilisers, evaluated as a group, are not effective in the severity of technology addiction symptoms, nor in reducing associated depressive and anxiety symptoms.	B
The atypical antipsychotic quetiapine may have efficacy in the severity of technology addiction symptoms.	C
Antidepressants do not appear to be more effective than opioid antagonists on depressive symptoms or anxiety symptoms.	D

Note: Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

4. EVIDENCE OF PSYCHOTHERAPEUTIC TREATMENTS

A review of the various therapies currently being used in pathological gambling and the effectiveness demonstrated by research in each of them is presented:

4.1 Psychoeducation

The aim of psychoeducation is to instruct patients about their disorder and how to manage it. It can be conducted individually, with family, or in groups. This type of intervention seeks to reduce myths or information that may be inappropriate or insufficient, which the patient and their family might have. Additionally, it fosters the connection between what the patient experiences and their condition, and it promotes the therapeutic alliance. Although its efficacy as a standalone treatment is not established, it is considered an integral part of the cognitive-behavioural approach. Therefore, the recommendation is for its integration within cognitive-behavioural programmes, though evidence is lacking.

4.2 Cognitive Therapy

Cognitive therapy is one of the interventions with the most empirical evidence. It explores the cognitive biases of the patient, such as the illusion of control, superstition, or the perception of being able to calculate the probabilities of winning. The objective is to guide the person to identify their beliefs associated with gambling and the relationship between thoughts, emotions, and behaviours. The most used technique is cognitive restructuring. In the review by Petry et al. (2017), 32% of the subjects assigned to cognitive therapy showed clinically significant improvements in gambling (amount spent and days gambled) compared to those on the waiting list. Other evidence included the study of Ladouceur et al. conducting a randomised study in 2001 in pathological gambling which they found clinical improvement with cognitive therapy compared to the control group, and repeated the study in 2003 with similar results. Thus, cognitive therapy shows benefits compared to the waiting list, although it has not been shown to be more effective than exposure therapy.

Grade of recommendation: B (evidence 1+) (Table 4). This should be integrated with the habitual treatment for the disorder.

4.3 Behavioural Therapy

Behavioural therapy employs techniques such as systematic desensitisation, relaxation, stimulus control, and *in vivo* exposure with response prevention, being another intervention with substantial empirical evidence. Stimulus control involves limiting access to money, avoiding places where gambling is available, and not spending time with people associated with gambling. As treatment progresses, stimulus control is gradually faded, except for avoiding people associated with gambling. Self-exclusion from gambling venues can complement the treatment. Exposure with response prevention aims at systematic exposure to gambling cues and risky situations to reduce their power

to induce gambling urges and behaviours. By preventing or controlling responses, the stimulus-response relationship is weakened. This type of therapy is designed to address cravings and gambling urges by increasing confidence in self-control. According to the meta-analysis by Pallesen et al. (2005), interventions involving the development of relaxation skills, exposure to gambling cues, and direct behavioural action are effective in improving gambling urges, time and money spent, and abstinence. Finally, virtual reality techniques provide a more controlled scenario for imaginal exposure without the need for live exposure, proving to be effective.

Grade of recommendation: B (evidence 1+). Current research supports multicomponent programmes that include behavioural techniques as part of the intervention.

4.4 Cognitive-Behavioural Therapy

Despite having various components, the most utilised and effective cognitive-behavioural therapy techniques are cognitive restructuring, problem-solving, social skills training, and relapse prevention. This therapy is more effective than self-help treatments, especially with the presence of a therapist compared to self-guided methods (Petry et al., 2017).

Grade of recommendation B (evidence 1+). Nowadays, it is the treatment of choice for pathological gambling.

4.5 Motivational Interviewing/Intervention

Previous studies evaluated motivational intervention alone, some finding effects (Carlbring et al., 2010) while others do not (Petry et al., 2008). Generally, there is little evidence of its benefits for gambling when not combined with cognitive-behavioural therapy. However, more recent studies suggest that motivational interviewing could have significant short-term efficacy in terms of money lost and gambling frequency, although long-term effects are maintained only in gambling frequency (Yakovenko et al., 2015). Nevertheless, when combined with cognitive-behavioural therapy, there is evidence of improved outcomes (Jiménez-Murcia et al., 2012).

Grade of recommendation: B (evidence 1+). It is usually used in combination with cognitive-behavioural therapy.

4.6 Self-Directed Therapy

In an individual format, cognitive-behavioural therapy is the most used in self-directed interventions, where the patient undertakes the techniques through self-guided materials (e.g., workbooks). Although this type of framing yields positive results, its effectiveness was enhanced when complemented, for example, by a motivational phone call from a therapist (Petry, et al., 2017).

Self-directed group therapy originated in Los Angeles in 1957, with the formation of the most well-known group to date, Gamblers Anonymous. Inspired by Alcoholics Anonymous, it consists of weekly group meetings where each gambler shares their case and circumstances, while the rest of the group engages in active listening and offers

their experiences and coping strategies. These groups are composed exclusively of gamblers and ex-gamblers, excluding the presence of a therapist. In addition to these group meetings, they also hold support and information meetings for the families of gamblers. It is important to distinguish between self-help groups and Gamblers' Associations, which involve professionals coordinating the sessions and conducting both individual and group interventions led by a therapist. Studies indicate that such groups achieve favourable outcomes, similar to twelve-step facilitation (TSF) therapy and congruence couple therapy. In both cases, effect sizes were comparable to those of cognitive-behavioural therapy, although the studies were not controlled trials.

Grade of recommendation: D (evidence 2-) (Table 4).

4.7 Brief Personalised Feedback Intervention

Personalised feedback provides patients with messages about their behaviour and functioning in relation to a norm. When personalised, these messages are tailored according to the individual's readiness to change and their personal goals. Meta-analyses have shown that personalised feedback in pathological gambling yields small but significant treatment effects (Peter et al., 2019). Even in three-month follow-ups, individuals who received personalised feedback sessions reported spending less money on gambling and experiencing fewer pathological gambling symptoms (Petry et al., 2017). However, other research suggests that these results might only apply in cases of higher severity. Using normative data as a reference could lead to contradictory outcomes where a person who gambles less might increase their gambling to reach the norm (Petry et al., 2017). Ribeiro et al. (2021) included this type of intervention in their meta-analysis, concluding that there was no evidence of its efficacy.

Grade of recommendation: C (evidence level 1-). Primarily used for prevention programmes.

4.8 Mindfulness and Third Generation Therapies

Maynard et al. (2018) found moderate to large effects for reducing gambling symptoms, craving, and financial outcomes. Regardless of the effects of mindfulness-based interventions, combining different processes like acceptance, awareness, and non-judgement was necessary to predict changes in craving (Sancho et al., 2018). In 2019, Melero-Ventola et al. conducted a study on the efficacy of the mindfulness-based stress reduction programme applied to relatives of pathological gamblers. Results indicated an improvement in perceived stress among family members who received these sessions.

Regarding third generation therapies, there is evidence that treatments based on acceptance and commitment therapy can be sustained more effectively during follow-up phases compared to cognitive-behavioural intervention control conditions (Lee et al., 2015). In a literature review by Salgar (2022), two studies on pathological gambling were found, both involving brief online acceptance and commitment therapy interventions: one using digital presentations and the other via a self-help book with individual

online sessions. In both cases, intervention on the verbal rule "being close to winning" influenced the reduction in subjective scales, although results were not statistically significant (Nastally & Dixon, 2012). They also noted that cognitive defusion training improved outcomes. Dialectical behaviour therapy has shown insufficient evidence in cases of pathological gambling. This is due to the methodology of the studies, with one being a single case study and others lacking control groups. These limitations place third-generation therapies methodologically in a similar situation to contextual therapies, which also face design limitations such as small sample sizes and reduced experimental control.

Grade of recommendation: D (evidence 2-). Recommended as an additional component to other techniques.

Table 4 shows a summary of the evidence found applied to the psychotherapeutic interventions mentioned before.

Table 4. *Summary of Evidence for Psychological Treatments.*

Type of Treatment	Level of Evidence	Level of Recommendation	Studies
Cognitive Therapy	1+	B	Cowlishaw et al. (2012) Ladouceur et al. (2001, 2003) Smith et al. (2015) Petry et al. (2017)
Behavioural Therapy	1+		Pallesen, Mitsem, Kvale, Johnsen, & Molde (2005)
Cognitive-Behavioural Therapy	1+	B	Gooding & Tarrier (2009) Jäger et al. (2012) Young (2013) Wölfling et al. (2014) King et al. (2017) Torres-Rodríguez et al. (2018) González Bueno et al. (2018)
Motivational Interviewing	1+	B	Yakovenko et al. (2015) García Caballero et al. (2018) Grant et al. (2009) Petry et al. (2008, 2009)
Exposure Therapy with Virtual Reality	1+	B	Segawa et al. (2019)
Self-Help Groups	2-	D	Toneatto & Ladoceur (2015)
Brief Intervention	1+	B	Petry, Ginley, & Rash (2017) Quilty et al. (2019)
Online Treatment	1+	B	Sagoe et al. (2021)
Mindfulness	2-	D	Maynard et al. (2018)
Personalised Feedback Therapy	1-	C	Peter et al. (2019)

Note: Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

4.9 Conclusions for pathological gambling

- Cognitive-behavioural approaches have considerable empirical support and are currently established as the psychological treatment of choice for pathological gambling.
- Multicomponent programmes and those tailored to each patient seem to be the future of intervention.
- Stress reduction techniques based on mindfulness, motivational intervention, or personalised feedback work better as part of a programme rather than as standalone interventions.
- The intervention with the most impact on gambling addiction is based on realistic goals and techniques such as training in rewarding activities, exposure, and relapse prevention.
- There is evidence of a better effect when there is therapist support compared to self-guided techniques.
- The severity of the disorder appears to inversely correlate with treatment success.
- Authors like Petry et al. (2017) recommend 6-8 sessions of cognitive-behavioural therapy that integrate motivational interventions for patients seeking help with pathological gambling.
- Online treatment modality is shown to be an interesting alternative since the results are promising and it also presents the advantage of overcoming barriers that patients used to face when accessing treatment.
- Group intervention is presented as a great therapeutic option, with cognitive-behavioural group therapy being one of the most considered in the clinical field.
- Treatment success appears to increase with the number of hours spent in therapy, suggesting that the chronic nature of pathological gambling requires more intensive treatments to achieve significant improvement. However, brief interventions are obtaining very good results (although it remains to be investigated which patient or disorder variables modulate this efficacy), which would increase efficiency given the lower cost and greater adaptability of interventions to all environments and devices.

4.10 Conclusions for video game addiction or gaming

- Interventions for video game addiction, both in its analogue and online versions, is starting to receive considerable attention. Literature reviews indicate that cognitive-behavioural therapy seems to be the predominantly used treatment approach.
- The studies are still very recent, of poorer methodological quality, and highly heterogeneous in criteria, methodology, and sociodemographic variables. In the reviewed literature, we generally find studies without control groups and with results that are not easily generalisable.
- Most of the studies use cognitive-behavioural therapy. For example, in Spain, several studies test the efficacy of the PIPAC programme, which consists of 6

modules: 1) psychoeducational, 2) standard intervention in behavioural addictions, 3) intrapersonal, 4) interpersonal, 5) family, and 6) creating a new lifestyle. Trials have concluded that the treatment is effective in reducing the disorder. Similarly, Anthony, Mills, and Nower (2020) found in their review that the most effective interventions were those aimed at harm reduction.

- The conceptualisation of online video game addiction remains inconsistent, as do the detection and diagnosis methods. All this hinders the pooling of data and research, and the type of sample prevents the generalisation of results.

5. BEHAVIOURAL ADDICTIONS AND OTHER CO-MORBIDITIES: EVIDENCE FROM PSYCHOLOGICAL AND PSYCHOPHARMACOLOGICAL TREATMENT

Pharmacological treatments are generally more detailed than psychological treatments, according to the literature. This often limits the ability to specify the techniques within each treatment format (cognitive-behavioural, 12-step AA, motivational interviewing) and for each comorbidity. However, emphasis is placed on the importance of making appropriate variations in psychological treatments, such as cognitive-behavioural therapy, tailored to each specific comorbid condition based on its characteristics. In this regard, specialised units in behavioural addictions, like the Clinical Psychology Unit at Bellvitge University Hospital (Barcelona), have developed internal treatment guidelines for diverse comorbidities in addictive processes.

5.1 Substance Use Disorders

Key challenges in treating this comorbidity include symptom severity, maintaining abstinence, and the potential impact of treating one disorder on the other. Table 5 shows the degree of evidence for treatments in this comorbidity.

Table 5. *Grade of recommendation of interventions for comorbidity of substance use disorders and behavioural addictions.*

Substance Use Disorders	Grade of Recommendation
Some authors recommend a transdiagnostic intervention addressing common mechanisms of substance and behavioural addictions.	D
Opioid antagonists such as naltrexone or nalmefene have proven effective in treating comorbidity of gambling disorder and alcohol use disorder. Additionally, they do not present adverse reactions to alcohol consumption.	A

Substance Use Disorders	Grade of Recommendation
N-acetylcysteine, recommended as an adjunct in nicotine addiction treatment, has shown some efficacy as a complementary treatment in nicotine and behavioural addiction comorbidity. However, there is evidence questioning its effectiveness, and it can cause adverse effects such as anhedonia.	C
GABA modulators, such as baclofen, are recommended for alcohol addiction treatment but may increase impulsive behaviours in behavioural addiction.	D
CBT has proven effective in treating the comorbidity of behavioural addiction and substance addiction.	B
Psychological intervention, including motivational components, has shown high effectiveness in treating comorbidity of behavioural and substance addictions.	A
The effectiveness of psychological and pharmacological interventions in comorbidity of substance use disorders and behavioural addictions suggests the benefit of a simultaneous approach with both types of interventions.	B
Other therapeutic approaches, such as stimulation of the dorsolateral prefrontal cortex, need more evidence to assess their effectiveness.	D

Note: CBT: cognitive behavioural therapy. Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

5.2 Other Mental Disorders

Table 6 shows a summary of the grade of recommendations for treatments of different mental disorders and behavioural addictions.

Table 6. *Grade of recommendation for interventions of comorbidity of other mental disorders and behavioural addictions.*

Other Mental Disorders	Grade of Recommendation
Treatment with CBT (in-person and online) has been the most widely analysed for addressing comorbidity: depression and gambling disorder. Positive responses have been observed in both disorders.	A
The antidepressant bupropion in the comorbidity treatment of depression and gambling disorder has shown good results, but the samples are small or case studies.	C
The use of escitalopram has been questioned due to a probable role in increasing or causing symptoms of behavioural addictions in patients with depression and gambling disorder. However, the samples are small or case studies.	C
The use of antidepressants and aripiprazole has been reported to increase the risk of clinical worsening of bipolar disorder and/or the development of a behavioural addiction. However, the samples are small or case studies.	C

Other Mental Disorders	Grade of Recommendation
Lithium has shown efficacy for the comorbid treatment of bipolar disorder and behavioural addictions. However, the samples are small or case studies.	C
Positive results have been reported from the use of CBT for comorbidity of anxiety and gambling disorder, but the samples are small or case studies.	B
The use of drugs such as escitalopram and tolcapone has shown positive results in comorbidity of anxiety and behavioural addictions. However, the samples are small or case studies.	C
Only one controlled study has tested the efficacy of different SSRIs (fluvoxamine, sertraline, or fluoxetine), or clomipramine in patients with internet addiction and OCD, showing positive results in both disorders. Being a single study with a small sample, it cannot be generalised.	D
The use of CBT (with or without simultaneous pharmacological treatment) has been reported for treating schizophrenia or other psychotic disorders comorbid with gambling disorder. However, the results are contradictory in studies with small sample sizes or case studies.	D
Potential benefits of methylphenidate and atomoxetine in the comorbidity of ADHD with internet addiction have been reported.	B
Results of combined treatment for behavioural addiction and eating disorders are scarce, recommending further studies in this area.	D
Results of combined treatment for behavioural addiction and personality disorders are scarce, recommending further studies in this area.	D

Note: CBT: cognitive behavioural therapy; ADHD: attention deficit hyperactivity disorder. Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

5.3 Parkinson's Disease

Table 7 shows the grade of recommendation for interventions in this Parkinson's disease and behavioural addictions comorbidities.

Table 7. *Grade of recommendation for interventions in comorbidity of Parkinson's disease and behavioural addictions.*

Parkinson's Disease	Grade of Recommendation
Impulse control problems and addictive behaviours in PD may be related to dopaminergic treatment for PD. Currently, there are no evidence-based pharmacological recommendations for treating this comorbidity. Some studies suggest that modifications in dopaminergic treatment may be effective as a first step depending on the case.	C

Parkinson's Disease	Grade of Recommendation
The current lack of evidence makes adjunctive treatment with other medications (e.g., antidepressants, antipsychotics, amantadine, zonisamide etc.) considered anecdotal in PD comorbidity with impulse control and addictive behaviours.	D
The efficacy of psychological therapy focused on CBT has been scarcely explored in this comorbidity, with promising results that require confirmation through randomised trials with larger sample sizes and longer follow-up periods.	C
Most neuromodulation studies refer to DBS. The literature shows mixed results regarding its efficacy in addressing impulse control problems and addictive behaviours in PD.	D

Note: PD: Parkinson's disease; CBT: cognitive behavioural therapy; DBS: deep brain stimulation.
Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

6. PREVENTION IN ADOLESCENTS AND YOUNG ADULTS

Recommendations on preventive gambling programs:

- It is emphasised the need to use or design theoretical models that specifically guide preventive interventions and incorporate the risk and protective factors with the highest predictive weight.
- Efforts should be focused on reducing the illusion of control and increasing knowledge about the actual probability of winning, thus minimising the idea of long-term profitability.
- However, other risk factors suggested by literature and evidence on prevention should not be neglected (e.g., relational: peer pressure; familial: parental attitude and behaviour; macrosocial: media pressure, normative perception, etc.).
- Professionals involved in the design and implementation of preventive programmes are recommended not to assume or understand cognitive measures and variables as indirect measures of the consequences of problematic gambling. It is suggested to complement cognitive measures with more accurate measures of the risk of harm associated with problematic gambling.
- Emphasis should be placed on having theoretical models that clearly establish the relationship between cognitive variables and the intention or behaviour of gambling.
- Evaluations should include measures of gambling behaviour as well as measures that allow for understanding the potential reduction of risk or associated problems.
- The programmes used should be relevant to minors, with appropriate timing and interactive methodologies.
- It is also recommended to have selective interventions that are consistent with the objectives of reducing associated problems and to increase this type of intervention.

- Given that in universal interventions gambling behaviour and expenditure are very small, it is recommended to use large samples that provide a percentage of minors with risky gambling, allowing for the evaluation of the reduction effects on gambling behaviour or associated problems (harm reduction) in follow-up measures.
- Adhering to methodological design and implementation criteria will allow for understanding the true effects of the programmes.
- Regarding evaluation instruments, it is recommended to use standardised, consensus-based, and validated instruments in the study population, as well as those adapted to the time frame that the programme intends to measure.
- Consensus on the categorisation of gambling behaviour variables (frequency, intensity of expenditure) is also recommended. This would allow for the comparison of results between interventions.
- Follow-up measures and reminder sessions are strongly recommended, aiming for measures at 6 and 12 months, to understand the potential long-term effects of the interventions, as there is evidence that effects diminish over time.
- Thus, the need to develop broader prevention programmes incorporating rigorous methodological and evaluation procedures, especially in the Spanish population, is highlighted.

Recommendations on preventing problematic video game use:

- Programmes should include components aimed at adolescents and their families. Programmes that combine different approaches have greater preventive capacity.
- Beyond the implementation of school prevention programmes, there are various technological measures to regulate use and accessibility to adult content. These measures can include blocking systems, restricted access, and behaviour tracking software with integrated feedback.
- In the context of risk and harm reduction related to gaming, some authors point to game time control as the main strategy. Regarding the number of weekly hours, although there is no consensus, they suggest that a limit of 25 hours per week could be a criterion for displaying personalised warnings in games.
- Given the high prevalence of problematic use/addiction to video games, it is urgent to develop selective and indicated preventive interventions.
- Interventions should be based on theoretical models that identify the most predictive risk and protective factors and their relationship with behaviour.
- The great heterogeneity of measurement instruments for the same variable makes it difficult to achieve comparable results. It would be desirable to reach a consensus in evaluating the severity of video game use.

7. PSYCHOLOGICAL INTERVENTIONS IN GAMBLING PROBLEMS AMONG ADOLESCENTS AND YOUNG ADULTS

Despite the increase in gambling prevalence and associated problems in recent years, research on the treatment of these issues remains very limited compared to the abundant research on prevention. Below is a summary of the main evidence of effectiveness for each of the reviewed psychological components and interventions based on a systematic review (Artamendi, López & Ruiz, 2024) with 1348 participants (62.3% males; mean age = 21.49 years), all of whom were university students. Caution must be taken since this sample is not particularly large, and the subjects' profile does not offer clear heterogeneity to establish robust conclusions and clear clinical implications.

7.1 Personalised or Normative Feedback

Studies indicate that the Personalised Feedback component successfully modifies normative perceptions regarding gambling frequency, annual expenditure, and losses, thereby halting the progression of gambling-related risk behaviours. This suggests that combining the personalised feedback component with motivational interviewing could be a particularly effective alternative (Artamendi et al, 2024).

Based on these results, this intervention has been assigned a Grade C recommendation (Table 8).

7.2 Cognitive-Behavioural Therapy

Although its effectiveness is widely proven in other child and adolescent addictive behaviours, research on young people with gambling problems is scarcer.

Firstly, cognitive-behavioural therapy, either alone or combined with a motivational interviewing session, appears effective in reducing participants' illusion of control, as well as gambling problems, DSM-IV-TR gambling disorder symptoms, and money spent on gambling. However, it fails to reduce expenditure compared to the control group and its combination with motivational interviewing does not seem to improve the results of the latter, with motivational interviewing being more effective in achieving significant improvements in players (Artamendi et al., 2024).

Based on these results, this intervention has been given a recommendation grade of C.

7.3 Other Components and Interventions

Other components and interventions evaluated in the studies included in this systematic review feature a digital application called the Digital Slot Machine Accelerator, an acceptance and commitment therapy intervention, and motivational interviewing.

Based on these results, these interventions have been given a recommendation grade of D (Table 8).

Table 8. *Evidence of psychological interventions in adolescents and young adults and recommendations based on the level of evidence.*

Intervention	Grade of Recommendation
Personalised (or normative) Feedback (PF)	C
Cognitive-Behavioural Therapy (CBT)	C
Digital Slot Machine Accelerator	D
Acceptance and Commitment Therapy (ACT)	D
Motivational Interviewing (MI)	D

Note: Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

8. NOSOLOGICAL AND THERAPEUTIC ASPECTS TO CONSIDER IN THE FUTURE

A committee of experts in the field of behavioural addictions (Brand et al., 2022), using a narrative review methodology and based on expert opinions, propose sufficiently conservative criteria termed meta-level criteria to help guide research efforts and clinical practice from scientific evidence, allowing the identification of behaviours that could be considered as behavioural addictions:

Criterion 1: Clinical relevance manifested by the presence of functional impairment in daily life. Empirical evidence from multiple scientific studies, including those involving individuals seeking treatment, must demonstrate that the addictive behaviour is clinically relevant and that individuals experience negative consequences and functional impairments in daily life due to these behaviours. Scientific studies should show that the candidate addictive behaviour is related to functional impairment that justifies treatment.

Criterion 2: Alignment with the phenomenology of addiction. Principle of parsimony. Current theories and models within the field of addiction research should adequately and simply describe and explain the candidate behaviour as addictive. If a behavioural phenomenon is to be considered a disorder due to addictive behaviours, the neuroscientific theories that explain addictive behaviours should be valid for the candidate phenomenon.

Criterion 3: Data based on self-reports, clinical interviews, surveys, behavioural experiments, and, if available, biological research (neuronal, physiological, genetic) should suggest that the psychological and neurobiological mechanisms involved in other established addictive behaviours are also valid for the candidate phenomenon and confirm construct validity.

Criterion 4: Gullo et al. (2022) add a fourth criterion to those initially proposed by Brand et al. (2022), which is the taxonomic plausibility as an externalising disorder.

The most debated candidate behaviours being considered as disorders due to addictive behaviours are discussed below (Table 9).

Table 9. *Summary of the evidence for the consideration of pornography use disorder, shopping use disorder and social network use disorder (online): disorders due to addictive behaviour.*

Authors	Methodology	Diagnostic or Meta-level Criteria Met	Level of Evidence
Pornography Use Disorder (online): coded as 6C5Y			
Brand et al., 2022	Review article	Criterion 1: Clinically relevant functional impairment Criterion 2: Explained by current addiction theories Criterion 3: Construct validity in empirical studies	Meta-analyses, systematic reviews, and representative studies
Compulsive Shopping Disorder: coded as 6C5Y			
Brand et al., 2022	Review article: expert opinions	Criterion 1: Clinically relevant functional impairment Criterion 2: Explained by current addiction theories Criterion 3: Construct validity in empirical studies	Meta-analyses, systematic reviews, and representative studies
Social Network Use Disorder: coded as 6C5Y			
Brand et al., 2022	Review article	Criterion 1: Clinically relevant functional impairment Criterion 2: Explained by current addiction theories Does not meet criterion 3: No construct validity in empirical studies	Meta-analyses, systematic reviews, and representative studies

9. GENDER AND BEHAVIOURAL ADDICTIONS

We summarize the evidence found regarding the relationship between behavioural addictions and gender, in Table 10 (Solé-Morata, Gaspar-Pérez, Fernández-Aranda, y Jiménez-Murcia, 2024).

Table 10. *Summary of evidence regarding behavioral addictions and gender.*

Results	Grade of Recommendation
Despite video game addiction being significantly associated with the male gender, the number of women playing video games has increased in recent decades, equalling the male population. Consequently, the prevalence of this disorder has risen in women.	A
Gender is a crucial factor in explaining why individuals develop internet addiction. While men tend to develop addictive behaviour through online gaming, women do so through social interaction. Indeed, women are more likely to develop social media addiction.	B

Results	Grade of Recommendation
The high-risk profile for social media addiction consists of young adult women with anxiety symptoms, unmet belonging needs, and anxious attachment.	B
The likelihood of developing compulsive shopping behaviour is more common in women compared to men.	B
Sociocultural factors play a central role in the observed differences between men and women. Compulsive shopping has been linked to individuals living in wealthier countries with higher economic incomes and more leisure time.	A
Most individuals seeking treatment for compulsive shopping problems are women.	B
Cognitive-behavioural therapy is shown to be the most promising approach for treating compulsive shopping.	A
Compulsive sexual behaviour disorder (CSBD) primarily affects men. However, this behaviour is becoming more common in the female population.	A
One of the main obstacles associated with diagnosing CSBD is that the psychological distress experienced stems from the associated social stigma.	A

Note: Grades of Recommendation: A = High; B = Moderate; C = Low; D = Very low

10. CONCLUSIONS

The review of the current scientific literature indicates consensus concerning the nosology of only two behavioural addictions: gambling disorder and gaming disorder. Although there are proposals and studies concerning other types of addictive behaviours in the scientific literature, there is not yet sufficient consensus to recognise sex addiction, compulsive shopping, internet addiction, or food addiction as behavioural addictions. Associated with this nosological difficulty is the absence of valid, reliable, and specific instruments.

In general, most people with a behavioural problem do not seek help from specialised centres, making it difficult to access this population. Therefore, community-based studies are essential to understand the range of behaviours and identify when behaviour shifts towards the psychopathological in a given context.

Unlike psychoactive substance addictions, there is no replacement therapy, and for some of these behaviours, a complete abstinence cannot be proposed (e.g., food, shopping, work, internet use), as they are necessary in some form for daily life, complicating treatment protocols, which will be a future challenge.

REFERENCES

Artamendi, S.; López, C.; Ruiz, M.J. (2024). Componentes e intervenciones psicológicas eficaces en los problemas de juego de apuestas en adolescentes y jóvenes. En: Guía clínica sobre adicciones comportamentales basada en la evidencia. (Arias F, Orio L, Coords). Valencia: Socidrogalcohol.

Brand, M., Rumpf, H., Demetrovics, Z., Müller, A., Stark, R., King, D. L., Goudriaan, A. E., Mann, K., Trotzke, P., Fineberg, N. A., Chamberlain, S. R., Kraus, S. W., Wegmann, E., Billieux, J., y Potenza, M. N. (2022). Which conditions should be considered as disorders in the International Classification of Diseases (ICD-11) designation of "other specified disorders due to addictive behaviors"?, *Journal of Behavioral Addictions*, *11*(2), 150-159. doi.org/10.1556/2006.2020.00035

Calado F, Griffiths MD. (2016). Problem gambling worldwide: An update and systematic review of empirical research (2000-2015). *Journal of Behavioral Addictions*, 5, 592-613.

Carlbring, P., Jonsson, J., Josephson, H., Forsberg, L. (2010). Motivational interviewing versus cognitive behavioral group therapy in the treatment of problem and pathological gambling: A randomized controlled trial. *Cognitive Behaviour Therapy*. 39(2), 92-103.

Danielsen, P. A., Mentzoni, R. A., & Låg, T. (2024). Treatment effects of therapeutic interventions for gaming disorder: A systematic review and meta-analysis. *Addictive Behaviors*, *149*, 107887. https://doi.org/10.1016/j.addbeh.2023.107887

ESPAD Group. (2020). ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs. Luxemburg.

Ferris, J., Wynne, H. (2001). The Canadian Problem Gambling Index: Final report. https://www.greo.ca/Modules/EvidenceCentre/files/Ferris%20et%20al(2001)The_Canadian_Problem_Gambling_Index.pdf

M, M., Leibetseder, M., Muench, H. M., Hofmann, S. G. y Laireiter, A. R. (2019). Pharmacological Treatments for Disordered Gambling: A Meta-analysis. *Journal of Gambling Studies*, *35*(2), 415–445. doi: 10.1007/s10899-018-09815-y

Griffiths, M. D. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10*, 191–197. https://doi.org/10.1080/14659890500114359

Gullo, M. J., Wood, A. P., & Saunders, J. B. (2022). Criteria for the establishment of a new behavioural addiction. *Journal of Behavioral Addictions*, *11*(2), 191-198. doi.org/10.1556/2006.2022.00031

Harpas, I., Stevens, M., Radunz, M., Williamson, P., Hamamura, T., Svendsen, O., & King, D. L. (2025). Treatment of gaming disorder: A systematic review and meta-analysis. *Psychiatry Research*, *354*, 116783. https://doi.org/10.1016/j.psychres.2025.116783

Jiménez-Murcia, S., Aymami, N., Gómez-Peña, M., Santamaría, J. J., Álvarez-Moya, E., Fernández-Aranda, et al. (2012). Does exposure and response prevention improve the results of group cognitive–behavioural therapy for male slot machine pathological gamblers? *British Journal of Clinical Psychology*, 51(1), 54–71.

Kraus, S. W., Etuk, R. y Potenza, M. N. (2020). Current pharmacotherapy for gambling disorder: a systematic review. *Expert Opinion on Pharmacotherapy*, *21(3)*, 287–296. doi: 10.1080/14656566.2019.1702969

Ladouceur, R., Sylvain, C., Boutin, C., Lachance, S., Doucet, C., Leblond, J. (2003). Group therapy for pathological gamblers: a cognitive approach. *Behavior Research Therapy*; 41(5), 587-96.

Lee, E., An, W., Levin, M., Twohig, M. (2015). An initial meta-analysis of acceptance and commitment therapy for treating substance use disorders. *Drug and Alcohol Dependence*, 155, 1-7.

Lesieur, H. R., & Blume, S. B. (1987) The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. *American Journal of Psychiatry,* 144, 1184–1188 https://doi.org/10.1176/ajp.144.9.1184

Maynard, B.R., Wilson, A. N., Labuzienski, E., Whiting, S. W. (2018). *Mindfulness*-based approaches in the treatment of disordered gambling: a systematic review and meta-analysis. *Research on Social Work Practice*, 28, 348-362.

Melero-Ventola, A.; Bernabé, J., Crego, A.; Cortés-Rodríguez, M.; Gómez Martínez, MA. (2019). Eficacia del programa de Reducción de Estrés basado en Atención Plena (REBAP) aplicado a familiares de jugadores patológicos. *Behavioral Psychology/Psicología Conductual*. 27, 355-373.

Mestre-Bach, G., & Potenza, M. N. (2024). Pharmacological management of gambling disorder: an update of the literature. *Expert Review of Neurotherapeutics*, *24*(4), 391–407. https://doi.org/10.1080/14737175.2024.2316833

Nastally, B.; Dixon, M. (2012). The Effect of a Brief Acceptance and Commitment Therapy Intervention on the Near-Miss Effect in Problem Gamblers. *The Psychological Record*, 62(4), 677–690.

Pallesen, S., Mitsem, M., Kvale, G., Johnsen, B. H., y Molde, H. (2005). Outcome of psychological treatments of pathological gambling: A review and meta-analysis. *Addiction*, *100*(10), 1412-1422.

Pallesen, S., Molde, H., Arnestad, H. M., Laberg, J. C., Skutle, A., Iversen, E.,... Holsten, F. (2007). Outcome of pharmacological treatments of pathological gambling: a review and meta-analysis. *Journal of Clinical Psychopharmacology*, *27*(4), 357–364. doi: 0.1097/jcp.013e3180dcc304d

Peter, S. C., Brett, E. I., Suda, M. T., Leavens, E. L., Miller, M. B., Leffingwell, T. R., ... y Meyers, A. W. (2019). A meta-analysis of brief personalized feedback interventions for problematic gambling. *Journal of Gambling Studies*, 35(2), 447-464.

Petry, N.M., Weinstock, J., Ledgerwood, D.M., Morasco, B. (2008). A randomized trial of brief interventions for problem and pathological gamblers. *Journal of Consulting and Clinical Psychology;* 76, 318–28.

Petry, N. M., Ginley, M. K., y Rash, C. J. (2017). A systematic review of treatments for problem gambling. *Psychology of Addictive Behaviors*, 31(8), 951.

Ribeiro, E. O., Alfonso, N. H., y Morgado, P. (2021). Non-pharmacological treatment of gambling disorder: a systematic review of randomized controlled trials. *BMC Psychiatry*, *21*(1), 1-15.

Salgar Cubillos, C. (2022). Eficacia de las terapias de tercera generación en el tratamiento de adicciones conductuales: una revisión sistemática. Bogotá D.C : Fundación Universitaria Konrad Lorenz, 2022.

Sancho, M., De Gracia, M., Rodríguez, R. C., Mallorquí-Bagué, N., Sánchez-González, J., Trujols, J., Sánchez, I., Jiménez-Murcia, S., Menchón, J. M. (2018). *Mindfulness*-based interventions for the treatment of substance and behavioral addictions: A systematic review. *Frontiers in Psychiatry, 9*.

Solé-Morata, N.; Gaspar-Pérez, A.; Fernández-Aranda, F.; Jiménez-Murcia, S. (2024). Género y adicciones comportamentales. En: Guía clínica sobre adicciones comportamentales basada en la evidencia. (Arias F, Orio L, Coords). Valencia: Socidrogalcohol.

Yakovenko, I., Quigley, L., Hemmelgarn, B.R., Hodgins, D.C., Ronksley, P. (2015). The efficacy of motivational inter-viewing for disordered gambling: Systematic review and meta-analysis. *Addictive Behavior*; 43, 72–82.

18

FROM NON-SUBSTANCE ADDICTIVE TO SUICIDAL BEHAVIOUR IN YOUTH: CORRELATES AND KEY PREVENTION STRATEGIES

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ABSTRACT:

This chapter offers a critical reflection and a technical-scientific proposal aimed at the school-based promotion and prevention of mental health in children, adolescents, and young adults. The rise of relationship, information, and communication technologies (RICTs) has contributed to the emergence and/or exacerbation of new forms of human psycho(patho)logy, highlighting the urgent need to re-evaluate classical psychological intervention models from a preventive, transdiagnostic perspective adapted to the challenges of the contemporary digital environment. This analysis is framed within a developmentally sensitive stage marked by high neuroplasticity, identity reconfiguration processes, and significant transformations in affective and social architecture, among other key milestones. Specifically, the chapter addresses two of the most pressing public health challenges affecting this population: behavioural addiction and suicidal behaviour. It explores their epidemiology, clinical characteristics, functional impact, course and prognosis, and their transdiagnostic correlates. Grounded in an ecological, evidence-based framework, the chapter argues for the implementation of structured intervention programmes within educational settings, capitalising on their potential for delivering universal, selective, and indicated actions. Within the conceptual framework of the Multi-Tiered System of Supports (MTSS), the chapter articulates strategies that enable tiered psychological care, supported by empirically valid and reliable assessment processes, with particular emphasis on early detection of prodromal symptomatology and adaptation to the specific needs of the student population. It examines the technical principles underpinning screening tools, as well as the preventive interventions with the strongest empirical support. Ultimately, the chapter underscores the importance of ensuring the methodological robustness of such actions, to minimise iatrogenic risks that could compromise the psychological integrity of the target population. The promotion of mental health —understood as the empowerment of psychosocial capacities and adaptive resources— is consolidated as a strategic priority in today's preventive agenda. This chapter therefore offers an ethical, scientific, and professional call to reflection: are we truly prepared to respond to the psychosocial challenges of a hyperconnected and emotionally vulnerable youth? The answer requires transcending traditional clinical care in favour of preventive, integrative, transdiagnostic, dimensional, and empirically grounded models. Within this landscape, psychology —as both a scientific discipline and transformative praxis— must assume a leading role in the design of effective, sustainable, and equitable solutions. As popular wisdom reminds us: "an ounce of prevention is worth a pound of cure"; and in mental health, this principle is not merely prudent, but imperative.

KEYWORDS:

youth mental health, psychological well-being, behavioural addiction, suicidal behaviour, transdiagnostic approach, multi-tiered school-based prevention

1. INTRODUCTION

Digital revolution has opened the way to new phenotypic expressions of human psycho(-patho)logy, above all, inducing and exacerbating non-substance addictive behaviours. The internet multiplies access to very heterogeneous set of activities, such as gambling, shopping, gaming, social media, sexual content, etc., which makes it the vector of evasion and possible addictive patterns. This problem is booming, and experts' opinion is unanimous in identifying the most vulnerable collective: children and adolescents, the so-called "digital natives" (Solmi et al., 2022). Surveys on Alcohol and other Drugs in Spain (EDADES/ESTUDES for acronyms in Spanish) estimate the problematic and dysfunctional use of gaming, gambling, and internet at around 5%, 8% and 20% among Spanish adolescents aged 14 to 18 (Spanish Observatory on Drugs and Addictions, 2023).

The scientific literature postulates the coexistence and linkage of behavioural addictions to a multitude of undesirable psychological phenomena, such as loneliness and social isolation, cyberbullying, anxiety, depression, or even suicidal behaviour (Azuddin et al., 2024; Coutelle et al., 2024). For example, a recent meta-analysis concluded that individuals with gambling problems had significantly increased odds of reporting lifetime suicidal ideation and suicide attempts compared to individuals without (Kristensen et al., 2024). Suicide is one of the leading causes of death for young people worldwide —the first absolute cause in Spain for 12-18 age group— and that the statistics continue to soar (Spanish National Statistics Institute [SNSI], 2023).

The purpose of this chapter is to delve into the correlates of addictive and suicidal behaviours during child and adolescence, offering a review of the key evidence-based prevention strategies (Hawton & Sinyor, 2025). This crossing begins with the conceptual delimitation, the state of the art in descriptive terms and a proposal of psychological assessment instruments. It continues with the analysis of risk and protective factors, and ends with the main preventive strategies and the promotion of mental health in adolescents in educational context. The importance of schools as the natural place to

promote the psychological adjustment problems is presented (Fonseca-Pedrero & Al-Halabí, 2025). In a cross-cutting manner, the contents are supported by recent research findings based on experimental methodologies, as well as systematic and meta-analytical reviews. Beyond nosology and diagnosis, these pages are built from a contextual, psychological and, above all, evidence-based approach.

2. NON-SUBSTANCE ADDICTIVE BEHAVIOUR AMONG YOUTHS

2.1 Digital natives: context and idiosyncrasy

The term 'digital natives' refers to the generations born since the 1990s, a time when Relation, Information and Communication Technologies (hereinafter, RICTs) are making their way into the mainstream and are an integral part of everyday life. This collective grows up immersed in an environment dominated by constant access to electronic devices, internet, social platforms and apps from the earliest stages of life, conditioning their cognitive, social and emotional development. Digital natives, therefore, exhibit remarkable proficiency in the use of such resources, allowing them to adapt naturally and fluently to fast-paced technological advances. It is thus a pre-existing condition that determines new ways of learning, relating, consuming and participating in recreational activities.

Prior to the expansion of RICTs, young people lived in an environment with limited availability of information. Access to knowledge was mainly restricted to physical sources, such as printed books, encyclopaedias and direct classroom teaching. Education followed traditional methods, with a mainly face-to-face approach, focused on the one-way transmission of content from teacher to student. In contrast, digital natives have immediate and virtually unlimited access to a vast amount of information through digital platforms, interactive applications, online tutorials and social networks. This has enabled more autonomous and personalised learning, adapted to the individual interests and pace of each student. Technological tools favour a more flexible educational approach, where learning becomes an active, interactive and self-guided process. In addition, the use of technology in schools has led to the implementation of more dynamic and collaborative teaching methodologies, such as gamification and project-based learning.

On the ludic side, RICTs have greatly diversified forms of entertainment. Past generations enjoyed recreational activities centred on physical interactions, whether through outdoor games, sports or face-to-face social gatherings. However, online video game platforms, streaming services and social networks offer personalised and highly interactive experiences, allowing young people to engage in real-time collaborative games with people from different parts of the world. In addition, access to on-demand content has altered cultural consumption habits, providing a flexible experience tailored to individual interests through algorithms.

On the other hand, social networks and instant messaging applications have changed the way socialise, allowing for constant virtual interaction without the constraints of

physical proximity. In terms of socialisation, digital connectivity has made it possible to form wider and more globalised social networks. Continuous contact through digital platforms has reduced geographical barriers, allowing instant communication anytime, anywhere. Interactions, however, are shorter and often limited to text messages, images or videos, or mere "likes", resulting in a more agile and real-time dialogue. In addition, dating apps have introduced new ways of making affective connections and transformed the dynamics of romantic relationships.

In addition, access to online shopping platforms has reshaped consumer habits. Through digital shops, young people can purchase products quickly and conveniently, which has led to a change in the way they perceive the shopping process. This access to a global marketplace offers a personalised consumer experience, without the geographical or availability constraints of traditional commerce. The rise of online payments, online gambling and the use of cryptocurrencies has created a new dynamic in the digital economy, particularly among young people. Through digital payment apps they have access to a faster and more convenient way to transact online. In parallel, cryptocurrencies have gained popularity, especially among young people interested in digital finance and investment, often driven by the appeal of its decentralised nature and profit potential.

In short, constant exposure to digital stimuli has accelerated the pace of young people's lives. Multitasking has become a commonly demanded skill, simultaneously managing academic, social, leisure and consumer activities across several devices. Some authors coin the terms hyperconnectivity and digital stress for this phenomenon and its impact on physical and mental health. Compared to previous generations, digital natives live in a more dynamic and complex environment, where benefits and opportunities, and risks and challenges associated with new technologies converge; among them, the behavioural patterns prodromal to digital addiction. Next, the prevalence of (ab)use of new technologies will be analysed, and, subsequently, the impact of these phenomena will be assessed from a psychological perspective.

2.2 (Ab)use of RICTs: epidemiological overview

The following lines aim to offer a brief glimpse into the epidemiology of those behavioural addictions that perpetuate RICTs and are most prevalent in the target population, namely problematic internet use, (online) gambling and video games. To this end, the main findings of the recent Spanish macro-surveys EDADES and ESTUDES (Spanish Observatory on Drugs and Addictions, 2023) are summarised below.

Firstly, recreational internet use among young people is almost entirely prevalent (~ 99.3%). The average time spent is 3.9 hours/day on weekdays and 4.2 hours/day on weekends, double the figures reported by the adult population. This parameter shows higher values in women and a tendency to increase with age in both time intervals. Specifically, 10.8% of users raise suspicions of problematic use of this tool, while 20.5% confirm compulsive behaviour patterns, mostly women again and in detriment of age. In addition, the consumption of pornographic content amounts to 66.8% of the

students surveyed; 86.3% of boys and 46.7% of girls. The older the age, the higher the consumption of pornography.

Secondly, ESTUDES reveals that gambling with money is more widespread in on-site modality (17.7%), especially among males and older adolescents. While girls show a clear preference for bingo, boys opt for lotteries such as "primitive", "bonoloto", or "quiniela", among others. On the other hand, the prevalence of gambling with money online has reached an all-time high in 2023 among the youngest (10.7%), being again more common among males and in older age groups. The most popular online games are video games and sports betting, followed by cryptocurrencies among men and bingo among women. In terms of financial investment in online games, 28.8% of students have spent more than 30 euros in a single day. Moreover, about 4% are suspected of problem gambling, 6% boys and 2% girls. This risk increases again with age, rising from 2.4% at age 14 to 8.3% at age 18. Online gambling seems to cause a higher risk of compulsive behaviour than on-site gambling and tends to motivate a higher financial investment.

Thirdly, 83.1% of students reported having played video games, being more prevalent among males. Most of them declare themselves to be players and spectators of eSports, showing an evolutionarily negative predisposition towards these activities. The most common practices seem to be weekly use of video games, with a dedication of between 1 and 4 days per week, less than 2 hours per day and no monetary investment for the improvement of position, character, accessories or image. However, it is estimated that around 13% of these adolescents are suspected of problematic use, while 5.1% meet *Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition* (DSM-5; American Psychiatric Association, 2013) diagnostic criteria for video game use disorder; 7.7% boys and 2.5% girls, with ages 14 and 18 being critical ages.

Finally, ESTUDES and EDADES conclude their report by pointing out that around 30% of the people monitored with suspected or confirmed problematic use of the RICTs, presented dual pathology with other behavioural and substance addiction patterns. Cause or consequence, at this point it is worth recalling the transdiagnostic correlates of these psychopathological profiles with other psychosocial health indicators. The following section aims to provide a non-exhaustive synthesis of the scientific literature on the subject, presenting the findings of some systematic reviews and meta-analyses.

2.3 Transdiagnostic correlates with dual mental health

Psychosocial health indicators in themselves may constitute a risk factor, a transdiagnostic symptom or a dual-course pathology for behavioural addictions related to RICTs. As logic would suggest, to a greater or lesser extent these psychopathological syndromes tend to maintain negative associations with positively valence constructs (i.e., well-being), and vice versa (i.e., distress). Without differentiating according to the type of addiction, let us look at the elements to which the scientific literature gives prominence.

On the one hand, analysis of the first set of variables reveals a significant deregulation of healthy lifestyle habits. Altered circadian rhythms and decreased sleep quality,

adoption of dysfunctional eating patterns and limited time for physical activity or exercise (Mihara & Higuchi, 2017). In the school setting it is common to find poor academic performance, a deficit in socialisation skills and social support, and an absence of a sense of belonging to the school (Gao et al., 2022). Within the family context, factors such as climate, cohesion, support and parental control are clearly declining (Schneider et al., 2017). Reviews highlight low self-esteem and a marked deficit in social-emotional competence, with special emphasis on autonomy and emotional and behavioural self-regulation skills (Ding et al., 2022). And so, overall, addictive behaviours in digital environments are negatively related to optimal levels of psychological well-being, life satisfaction and quality of life in young people (Limone et al., 2023).

On the other hand, from the analysis of the second set of variables, a repeated categorisation into four main dimensions is observed: psychological profile (i.e., personality, beliefs and attitudes), adverse experiences, and externalising and internalising symptoms. In the first dimension, a psychological profile characterised by aggressiveness and impulsivity, detachment and social isolation, a tendency towards self-blaming, and distorted metacognitions stands out (Coutelle et al., 2024). More specifically, González-Bueso et al. (2020) suggest the existence of two patterns of behaviour in young people with problematic gambling: a) type I: introversive, inhibited, doleful, unruly, forceful, oppositional, self-demeaning and borderline propensity, with increased presence of psychopathological comorbidity; and b) type II: histrionic, egotistic and conformist propensity, with less presence of dual pathology. Not forgetting, in this context, the role that family anamnesis plays in the development of any psychopathological problem (Azuddin et al., 2024).

In sum, the second-dimension highlights experiences of victimization in bullying and sexual abuse dynamics (Gao et al., 2022), with the associated manifestation of post-traumatic stress symptoms being a precipitating factor for digital media addiction (Hao et al., 2024). In terms of externalisation, it seems obvious to cite compulsive and problematic behaviours in the use of both digital environments and psychoactive substances. In the latter group, recurrent mention is made of the use of alcohol, tobacco, sedatives and opiates among the youngest (Azuddin et al., 2024). Moreover, attention deficit with(out) hyperactivity, disruptive behaviour and interpersonal relationship problems are postulated as relevant variables in this third classification (Coutelle et al., 2024).

Finally, the literature review notes that states of apathy, negative affect and loneliness are internalised elements strongly linked to non-substance behavioural addictions (Mihara & Higuchi, 2017). However, in spite of all the factors mentioned so far, the literature also emphasises and gives special protagonism to stress, anxiety and depression (Shannon et al., 2022). It is worth remembering that such syndromes are the most prevalent psychological problems among children, adolescents and young adults in our country (Fonseca-Pedrero et al., 2023a). This is where suicidal behaviour and its already assumed association with digital addiction deserves special mention (Kristensen et al., 2024; Marchant et al., 2017). The next section will try to shed light on why.

3. SUICIDAL BEHAVIOUR AMONG YOUTHS

3.1 A prior conceptual delimitation

The term suicide comes from the Latin *sui* ('oneself') and *caedere* ('to kill'). Its literal translation is 'to kill oneself'. But while worrying, the figures of young people who die by suicide are only the tip of the iceberg. Far from there being a consensus on its nomenclature in the scientific literature, an agreed conceptual definition and taxonomy is still lacking, which has an impact on the understanding, assessment, prevention, and intervention of suicidal behaviour (Pirkis et al., 2024). Not without controversy, the most accepted approach on this phenomenon contemplates a spectrum with elements of different idiosyncrasies and increasing intentionality, which go beyond the lethal act (García-Haro et al., 2023). Suicide is a multifaceted construct whose expression encompasses a dynamic continuum of ideation, planning and communication in life (Al-Halabí & Fonseca-Pedrero, 2021, 2023a, 2024; O'Connor & Nock, 2014). Thus, theoretically, suicide risk would be determined by the conjunction of the type of indicator and its level of intensity, frequency and functional interference (O'Connor & Pirkis, 2016). However, it is worth noting that scaling may not necessarily occur in a linear sequence, as the unpredictability of human behaviour may entail a leap from cognition to action (Fonseca-Pedrero & Pérez-Albéniz, 2020).

It is as important to define what is, as what is not. Suicidal behaviour should not be understood as equivalent to death by suicide, nor should it be defined or classified as a mental disorder with a nosologically entity. Moreover, this phenomenon can occur in the presence or absence of a diagnosis of mental disorder (García-Haro et al., 2020) and, in turn, it can also be transdiagnostic, i.e., it can be present in different health problems, both physical and psychological, including —as this chapter notes— patterns of behavioural addiction (Fonseca-Pedrero & Al-Halabí, 2024). It would be more of an existential drama than a symptom of a supposed "mental illness" or an "intrapsychic breakdown" that needs to be "cured". A diagnostic or linear and uncaused interpretation would not be appropriate (Hawton et al., 2022). Suicidal behaviour is part of human diversity and presents a complex, multifaceted, multidimensional, and multicausal nature (Al-Halabí & Fonseca-Pedrero, 2023b), which is beyond the scope of this chapter.

3.2 Magnitude of the phenomenon

The World Health Organization (WHO, 2014) ranks suicide as a major public health challenge. This phenomenon claims more than 700,000 lives every year, 1 every 40 seconds, and represents the fourth leading cause of death among young people worldwide (WHO, 2023). Spain, on the other hand, documented record figures for the fourth consecutive year (SNSI, 2023). During 2022, 4,097 suicide deaths were reported, an increase of 11.6% and 2.35% over 2019 and 2021, respectively. The statewide rate is 8.57 per 100,000 inhabitants, 12.98 in men and 4.33 in women. These data translate into an average of 11.2 suicides per day, 1 every 2 hours and a gender ratio of 3:1. The risk

of suicide at an early age doubles and quintuples in both groups. Among the fatalities, 333 adolescents and young adults aged 15-29, and 12 children younger than that. Since then, suicide is the absolute leading cause of death among young people.

Furthermore, Lim et al. (2019) compiled epidemiological publications on the suicide spectrum by grouping 686,672 children and adolescents in a meta-analysis. As a result, lifetime prevalence was 18% for ideation, 9.9% for planning and 6% for previous attempts; while prevalence in the last 12 months was 14.2%, 7.5% and 4.5%, respectively. At the national level, Fonseca-Pedrero and Pérez-Albéniz (2020) assessed the presence of suicide indicators in a sample of 3,454 Spanish adolescents. 26.7% stated that life was not worth living, 18.7% experienced death wishes, 17.8% thought about taking their own life, 5.9% acknowledged having a suicide plan, and 3.7% admitted suicide attempts. Both publications offer data prior to the record number of deaths by suicide in Spain (SNSI, 2023), so forecasts point to an even higher current trend.

From an incidence perspective, adolescence is considered a key developmental period for the emergence of mental health problems and suicidal behaviour (Solmi et al., 2022). Research marks the emergence of suicidality (Alqueza et al., 2021) and its potential predictors (Fusar-Poli, 2019) during early adolescence; the abrupt growth in its forms of manifestation during mid-late adolescence (Voss et al., 2019). For further emphasis, numerous studies warn that the age of onset (Thompson et al., 2012) and the presence of suicidal ideas and acts during this stage (Castellví et al., 2017) assume a prodromal and exacerbating character on future suicidal risk. These headlines underline the need for further research into the aetiological and transdiagnostic correlates of suicidal behaviour to strengthen preventive strategies in the face of its exponential mortality rate.

3.3 Transdiagnostic correlates with Non-Substance Addictive Behaviours

The link between patterns of behavioural addiction in digital settings and the suicide spectrum in the youth population has extensive and solid empirical evidence. Thus, for example, problematic use of the internet (Marchant et al., 2017), social media (Nesi et al., 2021) or online gaming (Kristensen et al., 2024) tends to correlate with higher severity and mortality parameters of suicidal behaviour. However, the literature reiterates an indirect relationship for this binomial; that is, digital addictions are not a direct cause or consequence of suicidality, but rather foster or perpetuate exposure to some of its main proximal risk factors (Richardson et al., 2024). At this point, the dynamics of negative reinforcement, the tendency to isolation and social comparison, cyberbullying experiences and the contagion effect or modelling learning take on special protagonism. Let's take a closer look at each of them.

First, in the framework of negative reinforcement, adolescents often resort to indiscriminate use of digital platforms as an avoidance strategy in the face of aversive emotional experiences, such as symptoms of stress, anxiety, or depression (Kostyrka et al., 2022). This behavioural pattern is fed back by the immediate decrease in psychological

distress. However, the temporary relief provided by avoidance does not address the underlying emotional difficulties but rather fosters a progressive disconnection from reality and psychosocial needs. This avoidance mechanism prevents direct confrontation with existential challenges, such as academic, family or interpersonal problems, postponing the resolution of unresolved intrapsychic conflicts and preventing the training of cognitive, emotional and behaviourally adaptive coping strategies. In this context, suicide may be perceived as a solution to the psychological suffering produced by the lack of functional resources to cope with adverse events (Falcó et al., 2024).

Secondly, behavioural addictions in digital environments, such as problematic use of social networks, video games or online gambling, foster social isolation by gradually replacing face-to-face interactions with virtual communication (Marchant et al., 2017). This isolation creates an emotional vacuum, intensifying the feeling of loneliness and affective disconnection. Moreover, constant exposure to digital content promotes social comparison, especially on platforms that value appearance, success and popularity. This leads young people to calibrate their self-esteem against virtual standards, generating cognitive dissonance and distortions in their self-image (Nesi et al., 2021). It is worth recalling at this point the need for peer group acceptance and the feeling of belonging to a social group inherent in these developmental stages. Persistent social comparison contributes to the assumption of a negative identity, leading to feelings of insufficiency and frustration (Khalaf et al., 2023). This impaired self-esteem, together with isolation, increases vulnerability to affective disorders such as depression and anxiety, classic risk factors for suicidal behaviour (Jiménez et al., 2024; Liu et al., 2022).

Thirdly, overexposure to digital settings amplifies online interactions, which increases the likelihood of being subjected to virtual aggression (Kostyrka et al., 2022). Characterised by continuity, anonymity and constant access, cyberbullying creates a persistent environment of harassment that exacerbates victims' sense of vulnerability. Prolonged exposure to this phenomenon erodes self-esteem, encourages the internalisation of a negative identity, and again fosters social isolation. Furthermore, cyberbullying reinforces hopelessness and learned helplessness (Hu et al., 2021), a cognitive-emotional process in which the individual perceives the situation as unsolvable, interminable and insufferable, a triad that is determinant for suicidal behaviour according to the phenomenological-contextual model (Al-Halabí & Fonseca-Pedrero, 2023b, 2024). Thus, suicide may be interpreted as a definitive solution to psychological distress, especially when the adolescent perceives that there are no viable alternatives to end the dynamics of cyberbullying (López-Fernández et al., 2024).

Finally, the contagion effect of suicidal behaviour in digital contexts is intrinsically linked to the 'Werther effect', a concept that describes how media exposure to suicides, especially when they are presented in a sensationalist or idealised way, can induce an increase in the incidence of suicidal behaviour in emotionally vulnerable individuals (Calvo et al., 2024). In other words, it warns of the risk of modelling learning from the suicidal experiences reported by other users. This effect is enhanced by the dissemination

of suicide-related content, which is sometimes promoted without adequate contextualisation or warning about its risks. The representation of suicide as a romantic or heroic escape from emotional suffering increases the likelihood that other individuals, particularly young people, will adopt suicidal behaviour as a viable solution to their psychological difficulties (Guinovart et al., 2023). Thus, adolescents who are exposed to suicidal content glorifying death, may experience increased internalisation of suicidal ideation, leading them to emulate these behaviours (Niederkrotenthaler et al., 2022).

In conclusion, the link between behavioural addiction in digital environments and suicidal behaviour is a complex phenomenon involving emotional, cognitive and social factors. Intensified social isolation, emotional avoidance and exposure to cyberbullying experiences and harmful content increase young people's vulnerability to suicidal behaviour. In this scenario, early detection and personalised therapeutic intervention are essential. The following section will explore mental health promotion and prevention strategies that are essential to address and mitigate the implications of these issues for the psychosocial well-being of children, adolescents and young adults.

4. PROMOTION AND PREVENTION OF YOUTH MENTAL HEALTH

4.1 Where? Towards a (Mental) Health-Promoting School

UNESCO's Delors Report highlights this under the slogan *Learning: The treasure within* (Delors, 1996). Health and Education are the backbone of young people's future in unison. Learning is best consolidated in a healthy population —physically and mentally— and this is a reality that should not be ignored (Datu & King, 2018). In the field in question, evidence-based programs for the promotion of psychological well-being and the prevention of mental health problems are essential to enable children and young people to cope successfully with the vicissitudes of life (Al-Halabí & Fonseca-Pedrero, 2025). It is at this point that the educational centre —school, college or university— takes on a special role, with multiple interventions with extensive empirical support (Fonseca-Pedrero et al., 2023a, 2023b, 2023c). In fact, WHO (2021b) call for 'making every school a (mental) health-promoting school'.

The educational institution is undoubtedly the engine of health and psychosocial well-being, providing holistic care for its students within a safe, equitable and inclusive system (Fonseca-Pedrero et al., 2023c). Thus, we are therefore talking about a natural and ideal scenario to implement actions for the promotion of positive mental health and for the prevention of psychological adjustment difficulties (Durlak et al., 2022). The WHO *Guideline on School Health Services* (WHO, 2021c) point out that classrooms provide an enabling space for socialisation, training and the promotion of optimal development and learning. They build meaningful experiences that help young people create their identities, develop critical thinking, build strong interpersonal relationships and acquire social-emotional competencies and adaptive coping strategies for life (WHO, 2021a).

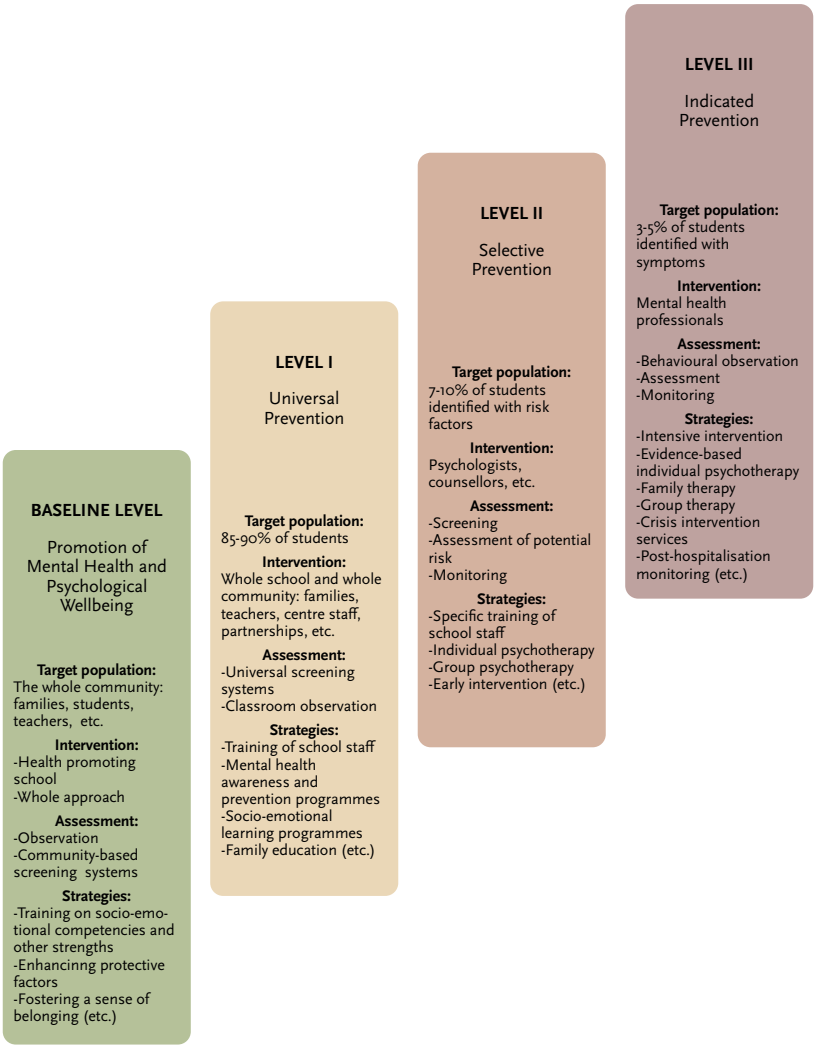
A Mental Health-Promoting School facilitates coordinated access to professional and specialised care, enables early detection and intervention in cases with (suspected or at risk of) psychological difficulties, reduces school dropout and absenteeism, and optimises the development and learning of its students (Panchal et al., 2022). With the intention of turning utopia into reality, the *Guideline for School Health Services* (WHO, 2021c) stipulates 87 specific interventions that must be framed in a comprehensive action model or "whole-school approach" (Simões et al., 2021). Thus, promotion and prevention of the psycho(patho)logical is a matter for the whole educational community.

4.2 How? Through a Multi-Tiered System of Support

Within this holistic framework, it is necessary to refer to the Multi-Tiered System of Support (MTSS). This approach seeks to implement a variety of multi-component actions according to objectives and target groups (see Figure 1). Level 1 strategies are evidence-based methods that are applied consistently and systematically across the student population. These strategies aim to instruct all students in appropriate behaviours and skills to foster a positive school environment and optimise learning, among other objectives (e.g., digital education for self-directed learning). Level 2 prevention strategies target students whose behaviours do not respond adequately to level 1 interventions. They are applied to small groups of students as a 'standard protocol' or evidence-based curriculum; for example, a programme designed to develop specific skills (e.g., digital hygiene, responsible and safe use of RICTs against cyberbullying or grooming). Level 3 strategies are highly specialised interventions targeted at specific students with 'high-risk' behaviours (e.g., contingency management techniques against hyperconnectivity to online video games). MTSS applied in the educational setting is fully analogous to the three-tiered model of prevention (universal, selective and indicated, respectively) in which a more basic layer related to the promotion of psychological well-being has been included (Institute of Medicine Committee on Prevention of Mental Disorders, 1994).

This approach facilitates personalised and graduated care ranging from the promotion of well-being to distress prevention. In cases of persistence or severity of the problem, referral to specialised institutions, such as child and adolescent mental health units, is required. It is effectively integrated into the MTSS proposal, aimed at preventing academic, behavioural and emotional difficulties of students through the provision of equitable and evidence-based academic and psychological services, following an ecological approach (Loftus-Rattan et al., 2023). These assumptions encourage future research to focus on multi-level interventions because of their more robust effects and synergistic potential. Thus, note in the above figure that there are two pillars that articulate transversally the MTSS: evidence-based assessment and student empowerment via psychosocial strengths. Let us look at them in more detail.

Figure 1. *Multi-level Strategy Model for a Mental Health Promoting School*



Note. Adapted from Fonseca-Pedrero et al. (2023a).

4.2.1 *Evidence-based Assessment System*

By way of reminder, the principles underpinning an evidence-based assessment system for youth mental health screening are briefly listed (Fonseca-Pedrero et al., 2025):

(1) *Prevailing scientific paradigm*. In the field of mental health, we are witnessing a reconceptualization of the construct itself, moving away from classical biomedical epistemology and taxonomy towards a phenomenological-contextual and dimensional view

of psychological problems. Thus, the assessment purposes to be doubly holistic: 1) to consider the symptom as a strategy and not (only) as a pathognomonic dysfunction of a mental disorder; and 2) to offer equal attention to the examination of psychological distress and risk factors, as opposed to psychological well-being and protective factors.

(2) *Deontological code and current legislation*. Psychological assessment must be valid and reliable, as it vectors decision-making with important implications for the individual (and the agents in his/her environment) and for the management of cross-sectoral resources. The psychologist must act in accordance with the deontological code, current legislation and international guidelines concerning the use, safety and quality control of assessment instruments. Without proper evaluation it would also not be possible to assess the efficacy, effectiveness and efficiency of a preventive intervention.

(3) *Psychometric guarantees of the instruments*. Once the objectives and areas of exploration have been defined, the next step is to select the techniques and instruments for obtaining empirical evidence. It is imperative that the assessment protocol confers psychometric guarantees of validity, reliability and standardisation. In this way, will we be able to carry out an assessment based on empirical evidence on which to base decision-making. It should not be forgotten that the development of multi-source and multi-method systems provides, in essence, greater objectivity and precision.

(4) *Incorporation of new technologies*. The great technological advances now make it possible to implement a more precise, versatile, contextual, ideographic, phenomenological, functional and multi-dimensional psychological assessment which translates into greater ecological validity of measurement. This methodology, still emerging, is known as ambulatory assessment. Not without its advantages and limitations, its aim is to understand dynamic psychological processes as they develop in everyday life and according to the circumstances of individuals, as well as to investigate possible mechanisms of change, beyond mere clinical or topographical description.

(5) *Professional expertise*. The assessment system comprises not only measurement tools, but also human resources combined with professional expertise. Data do not know psychology, nor are they able to differentiate between descriptive and causal. Human interpretation is essential for making inferences and decisions. Giving meaning to the computation of quantitative and qualitative information offers a deeper, truer and more sensible understanding of the psychological constructs being assessed.

Based on these principles, the following is a brief literature review on screening for variables under study in this chapter: non-substance addictive and suicidal behaviour in the youth population. See Becker-Haimes et al. (2020) or Waite and Atkinson (2021) for an inventory of brief, validated, free and accessible techniques for assessment other transdiagnostic indicators of dual mental health and its psychometric properties for this specific collective.

Screening Non-Substance Addictive Behaviour

The identification of abuse of RICTs can be complex, probably because potential problems are hidden by the pervasiveness and normalisation of their use. In fact, some research suggests that non-substance addictive behaviours are not necessarily related to the number of hours spent in a comparative with the number or quantity of psychotropic substances consumed (King et al., 2018). Fortunately, it is possible to identify certain behaviours that could be indicative of a problem. Obviously, these signs vary according to the nature and function of the digital tools in youths; problematic use of digital devices for playing online poker or gambling is not the same as playing video games or interacting socially. In the vocabulary of psychological discipline, the main signs translate into suspicions of craving, tolerance, dependence, withdrawal, loss of control and dysfunctionality, diagnostic criteria for (non-substance) addictive patterns with their own nosologically entity. Table 1 presents the most used psychometric instruments for the screening of internet use disorders in youths and directed, specifically, to the analysis of these parameters. Please refer to Pérez-Sáenz (2023) for a more comprehensive review of empirically valid and reliable assessment techniques and test of international use.

Table 1. *Assessment of non-substance addictive behaviours in youths*

Instrument	Acronym	Authors	Items	Dimensions
Compulsive Internet Use Scale	CIUS	Meerkerk et al. (2009)	14	Compulsive Internet use: Loss of control, preoccupation, withdrawal, conflict and coping
Video Game Addiction Test	VAT	van Rooij et al. (2012)	4	Gaming (one-dimensional scale)
Video Game Dependency Scale	CSAS-II	Rehbein et al. (2015)	18	DSM-5 criteria of internet gaming disorder: Self-rating and rating by a family member
Internet Addiction Test	IAT	Young (1998)	20	DSM-IV criteria of substance dependence and pathological gambling: Salience, excessive use, neglecting work, anticipation, lack of control, neglecting social life
Short Internet Addiction Test	s-IAT	Pawlikowski et al. (2013)	12	Loss of control/time management Craving/social problems
Assessment for Computer and Internet Addiction-Screener	AICA-S	Wölfling et al. (2010)	16	DSM-IV-TR and ICD-10 criteria
Structural Clinical Interview for Internet Gaming Disorder	SCI-IGD	Koo et al. (2017)	12	Diagnostic interview based on DSM-5 criteria of internet gaming disorder

Note. Adapted from Lindenberg et al. (2020).

Screening Suicidal Behaviour

Assessment of youth suicidal behaviour should not be approached from an abstract clinical perspective but should be integrated into the actual contexts and practices in which professionals provide support. The best tool for the assessment of this phenomenon is the clinical interview aimed at identifying both risk and protective factors and the person's reasons for living (Al-Halabí & García-Haro, 2021). While it is true that there is no psychometric test for assessing suicidal behaviour that has reliable predictive ability on its own, scales or questionnaires can be used to complement it. In indicated prevention, research shows that asking about suicidal ideation not only does not lead to distress and/or new suicidal thoughts but also decreases the risk of committing the act (Berman & Silverman, 2017) by increasing the likelihood of identification by 600% of cases (Bryan et al., 2008). Thus, previous studies have demonstrated the efficacy of early detection programs in suicidal behaviour in young people using measurement tools with optimal psychometric properties (Carli et al., 2021).

In previous literature there is a wide range of measurement tests for the assessment of suicidal behaviour in youth population (Saab et al., 2022). The scale with the strongest scientific support (Interian et al., 2018) is the *Columbia Suicide Severity Rating Scale* (Al-Halabí et al., 2016; Posner et al., 2011). Different measurement instruments have also been developed and validated in representative samples, such as the *Paykel Suicide Scale* (Paykel et al., 1974) and the *Adolescent Suicidal Behaviour Assessment Scale* (Díez-Gómez et al., 2020). These are brief, simple assessment tools with adequate metric quality that enable the screening of the whole phenotypic spectrum of suicidality among young people.

4.2.2 *Evidence-Based School Prevention Programs*

Strategies for the Baseline and Levels I-II

The promotion of psychological well-being and universal and selective prevention of mental health problems tend to have the empowerment of psychological strengths as a common vector. In fact, in the Spanish educational system, various educational reforms have introduced the need for specific training in socio-emotional competencies. This area emphasises knowledges, abilities, skills, principles and personal values. Countless conceptual and taxonomic proposals have been configured around it and, therefore, countless programmes aimed at its training (e.g., Cobos-Sánchez et al., 2018). When examining this review, a question arises: What is the empirical evidence for these programs? The reality is that further analysis of their efficacy, effectiveness and efficiency is required to support their implementation (Piqueras et al., 2022).

To make matters worse, the scientific literature also warns that some school-based mental health interventions can cause iatrogenic harm (Foulkes & Stringaris, 2023). The unequivocal mechanisms by which this occurs are not yet known, but it seems reasonable that quality, empirically supported work is at least a primary condition. Therefore, caution must be pitted against the idea that it is better to implement any intervention than not to do so (Foulkes & Stringaris, 2023). There may be children, adolescents and/

or young adults who experienced harm from the interventions and that this outcome may be masked when results are averaged at the group level (Montero-Marin et al., 2022). So, is there scientific evidence to support psychological interventions in educational institutions? The answer, in this case, is affirmative. There are affordable, effective and feasible strategies to promote, protect and restore mental health in educational settings (Fusar-Poli et al., 2021; Wang et al., 2024).

> The science of prevention in mental health is based on the maxim that psychological problems can be avoided or reduced (Al-Halabí & Fonseca-Pedrero, 2025). Thus, for example, universal prevention programmes for depression and anxiety in educational settings are shown to be effective immediately after the intervention (Werner-Seidler et al., 2021). Previous work provides effect sizes for universal, selective and indicated intervention of $g = 0.29$, $g = 0.67$, and $g = 0.76$, correspondingly (Sanchez et al., 2018). These findings translate into specific prevention programmes showing statistically and clinically more relevant changes in mental health outcomes compared to universal prevention programmes. It should be noted that universal school programmes with a transdiagnostic approach have a small to medium overall effect size (Wang et al., 2024). Not to mention that specific prevention programmes can have 'cross-over effects' by sharing active ingredients, impacting on different types of behaviour or clinical syndromes of young people (Ayer et al., 2023).

Strategies for Levels II-III

Table 2 illustrates levels of evidence and grades of recommendation for psychological interventions in non-substance addictive and suicidal behaviours among children and adolescents, according to the Spanish National Health System and Clinical Practice Guidelines (Fonseca-Pedrero et al., 2021). In the field at hand, depending on the type of addiction, some of the treatments have more empirical support than others. Most intervention programs have focused on Internet addiction and Internet gaming disorder, with greater evidence for cognitive behavioural therapy (CBT) and family therapy (grade of recommendation B). Motivational interviewing stands out for addressing risk behaviours (grade of recommendation A). As for school-based prevention programs, multicomponent interventions are the most effective, especially the PROTECT program (Lindenberg et al., 2017, 2020), the P.A.T.H.S. project (Shek et al., 2011), the B.E.S.T Teen program (Shek et al., 2016) and Cyberhero Mobile Safety (Hswen et al., 2014). Spain also has a web portal for free access and consultation on good practices in tackling addictions, which synthesises technical information and consultation material on prevention programmes based on scientific evidence, with the aim of promoting their implementation and transfer (Spanish Government Delegation for the National Plan on Drugs, 2025).

Table 2. *Levels of evidence and grades of recommendation for psychological interventions*

Problem	Intervention	Level of evidence	Grade of recommendation
Risk behaviours	Motivational interview	1-	B
Video game addiction	Cognitive-behavioural therapy	1+	B
	Mindfulness	3	D
	Family therapy	2-	D
	Individualised Psychotherapeutic Program for Addiction to Information and Communication Technologies (PIPATIC)	2+	C
Internet addiction	Cognitive-behavioural therapy	1+	B
	Positive psychology-based interventions	2-	D
	Family therapy	2+	C
	PROTECT Program	2-	D
	PATHS Project	2+	C
	B.E.S.T. Teen Program (prevention)	2+	C
Cybersex addiction	Cognitive-behavioural therapy	1+	B
Mobile (ab)use	*Cyberhero Mobile Safety* (prevention)	3	D
Suicidal behaviour	Dialectical behavioural therapy for adolescents	1++	A
	Interpersonal psychotherapy for adolescents	1+	B
	Integrated cognitive-behavioural therapy	1+	B
	Mentalisation-based therapy for adolescents	1+	B
	Program for parents and adolescents (*Resourceful Adolescent Parent Program*)	1+	B
	Integrated family intervention (*Safe Alternatives for Teens & Youths*)	1+	B
	Psychoeducation (*Youth-Nominated Support*)	1+	B
	Brief interventions *(Teens Options for Change and As Safe As Possible)*	1+	B
	Family Intervention for Suicide Prevention	1+	B

Note. Adapted from Fonseca-Pedrero et al. (2021). Level of evidence and grade of recommendation stipulated in clinical practice guidelines of the Spanish National Health System: 1++ > 4 and A > D.

Moreover, in the approach to suicidal behaviour, dialectical behavioural therapy for adolescents leads as the only well-established psychological treatment with a grade A recommendation. With a grade B recommendation are interpersonal psychotherapy for adolescents, integrated CBT, mentalization-based therapy for adolescents, integrated family intervention, psychoeducation, brief interventions, and specific family intervention for suicide prevention. In any case, remember that rather than cure, it should be prevented; rather than prevention, it should be promoted.

5. CONCLUSIONS

Mental health problems in the youth population represent one of the main challenges of the 21st century. Anxiety and depression are the most prevalent psychological phenomena, and suicide is already the leading cause of death at this stage of development. Moreover, these problems have intensified with the rise and mimicry of RICTs in everyday life, tools whose idiosyncrasies foster, perpetuate and exacerbate transdiagnostic correlates and give rise to new forms of human psycho(patho)logy, such as non-substance addictive behaviours or digital addiction. In this context, it is essential that mental health interventions are based on scientific evidence, ensuring their effectiveness and minimising any iatrogenic effects. The culture of prevention, from the perspective of psychological science, must adapt and respond to a digitalised society that is constantly changing and evolving.

Paradoxically, RICTs can become valuable allies in the implementation of mental health programmes. Thanks to their accessibility, these technologies facilitate the provision of remote therapeutic resources, real-time emotional support and access to tools that complement traditional treatments. Thus, the appropriate use of digital technologies not only makes it possible to overcome geographical barriers but also favours early intervention and the continuity of face-to-face treatment, crucial aspects for providing comprehensive psychological care.

However, prevention should be only one component of a broader approach that also includes active mental health promotion. This perspective is not limited to risk reduction alone but seeks to strengthen the psychosocial capacities of young people, improving their resilience and overall well-being. In this sense, educational settings represent an ideal scenario for its implementation, allowing the participation of students, families and professionals in a joint and coordinated effort. The therapeutic approach should prioritise promotion and prevention, rather than focusing exclusively on cure. As Benjamin Franklin said, 'an ounce of prevention is worth a pound of cure'.

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REFERENCES

Al-Halabí, S., & Fonseca-Pedrero, E. (2021). Suicidal behavior prevention: The time to act is now. *Clínica y Salud, 32*(2), 89-92.

Al-Halabí, S., & Fonseca-Pedrero, E. (2023a). Are there common components in effective psychotherapies for suicidal behavior? Implications for professional practice. *Revista de Psicoterapia, 34*(124), 83-99.

Al-Halabí, S., & Fonseca-Pedrero, E. (2023b). *Manual de psicología de la conducta suicida*. Pirámide.

Al-Halabí, S., & Fonseca-Pedrero, E. (2024). Editorial for Special Issue on Understanding and Prevention of Suicidal Behavior: Humanizing Care and Integrating Social Determinants. *Psicothema, 36*(4), 309-318.

Al-Halabí, S., & Fonseca-Pedrero, E. (2025). Cultura de la prevención y criterios de calidad en la investigación. In E. Fonseca-Pedrero and S. Al-Halabí (Eds.), *Salud mental en contextos educativos* (pp. 137-180). Pirámide.

Al-Halabí, S., & García-Haro, J. M. (2021). Tratamientos psicológicos para la conducta suicida. In E. Fonseca-Pedrero (Ed.), *Manual de tratamientos psicológicos. Adultos* (pp. 639-675). Pirámide.

Al-Halabí, S., Sáiz, P. A., Burón, P., Garrido, M., Benabarre, A., Jiménez, E., Cervilla, J., Navarrete, M. I., Díaz-Mesa, E. M., García-Álvarez, L., Muñiz, J., Posner, K., Oquendo, M. A., García-Portilla, M. P., & Bobes, J. (2016). Validation of a Spanish version of the Columbia-Suicide Severity Rating Scale (C-SSRS). Validación de la versión en español de la Columbia-Suicide Severity Rating Scale. *Revista de Psiquiatria y Salud Mental, 9*(3), 134-142.

Alqueza, K. L., Pagliaccio, D., Durham, K., Srinivasan, A., Stewart, J. G., & Auerbach, R. P. (2021). Suicidal Thoughts and Behaviors Among Adolescent Psychiatric Inpatients. *Archives of Suicide Research, 27*(2), 1-14.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)*. Author.

Ayer, L., Stevens, C., Reider, E., Sims, B., Colpe, L., & Pearson, J. (2023). Preventing Youth Suicide: Potential "Crossover Effects" of Existing School-Based Programs. *Prevention Science, 24*(2), 382-392.

Azuddin, S. K. Y., Farid, N. D., Zaki, R. A., Ismail, Z., & Mustafa, W. A. W. (2024) Problematic internet use and mental health correlates among children: A systematic review. *Journal of Advanced Research in Applied Sciences and Engineering Technology, 34*(1), 257-278.

Becker-Haimes, E. M., Tabachnick, A. R., Last, B. S., Stewart, R. E., Hasan-Granier, A., & Beidas, R. S. (2020). Evidence Base Update for Brief, Free, and Accessible Youth Mental Health Measures. *Journal of Clinical Child and Adolescent Psychology, 49*(1), 1-17.

Becoña, E. (2023). *Guidelines for good practice and quality in the prevention of drug dependence and addiction.* Plan Nacional sobre Drogas.

Berman, A. L., & Silverman, M. M. (2017). How to ask about suicide? A question in need of an empirical answer. *Crisis, 38*(4), 213–216.

Bryan, C. J., Corso, K. A., Rudd, M. D., & Cordero, L. (2008). Improving identification of suicidal patients in primary care through routine screening. *Primary Care & Community Psychiatry, 13*(4), 143-147.

Calvo, S., Carrasco, J. P., Conde-Pumpido, C., Esteve, J., & Aguilar, E. J. (2024). Does suicide contagion (Werther effect) take place in response to social media? A systematic review. *Spanish Journal of Psychiatry and Mental Health,* S2950-2853(24)00032-2.

Carli, V., Iosue, M., & Wasserman, D. (2021). Universal suicide prevention in schools. In D. Wasserman (Ed.), *Oxford Textbook of Suicidology and Suicide Prevention (2 ed.)* (pp. 653-664). Oxford University Press.

Cobos-Sánchez, L., Contreras, J. M. F., & Becerra, I. G. (2018). Revisión de protocolos de intervención en educación emocional en adolescentes en contextos educativos a nivel grupal. *Revista de Estudios de Juventud, 121*, 151-167.

Coutelle, R., Balzer, J., Rolling, J., & Lalanne, L. (2024). Problematic gaming, psychiatric comorbidities, and adolescence: A systematic review of the literature. *Addictive behaviors, 157*, 108091.

Datu, J. A. D., & King, R. B. (2018). Subjective well-being is reciprocally associated with academic engagement: A two-wave longitudinal study. *Journal of School Psychology, 69*, 100-110.

Delors, J. (1996). *Learning: the treasure within. Report to UNESCO of the International Commission on Education for the Twenty-first Century*. UNESCO Publishing.

Díez-Gómez, A., Pérez-Albéniz, A., Ortuño-Sierra, J., & Fonseca-Pedrero, E. (2020). SENTIA: An Adolescent Suicidal Behavior Assessment Scale. *Psicothema, 32*(3), 382–389.

Díez-Gómez, A., Sebastián-Enesco, C., Pérez-Albéniz, A., & Fonseca-Pedrero, E. (2021). Suicidal behavior assessment in adolescents: Validation of the SENTIA-Brief scale. *Actas Españolas de Psiquiatría, 49*(1), 24-34.

Ding, Y., Wan, X., Lu, G., Huang, H., Liang, Y., Yu, J., & Chen, C. (2022). The associations between smartphone addiction and self-esteem, self-control, and social support among Chinese adolescents: A meta-analysis. *Frontiers in Psychology, 13,* 1029323.

Durlak, J. A., Mahoney, J. L., & Boyle, A. E. (2022). What we know, and what we need to find out about universal, school-based social and emotional learning programs for children and adolescents: A review of meta-analyses and directions for future research. *Psychological Bulletin, 148*(11-12), 765-782.

Falcó, R., Falcon, S., Moreno-Amador, B., Piqueras, J. A., & Marzo, J. C. (2024). Which Psychosocial Strengths Could Combat the Adolescent Suicide Spectrum? Dissecting the Covitality Model. *Psychosocial intervention, 33*(3), 133–146

Fonseca-Pedrero, E. (2021). *Manual de tratamientos psicológicos. Infancia y adolescencia*. Pirámide.

Fonseca-Pedrero, E., & Al-Halabí, S. (2024). Sobre la conducta suicida y las conductas adictivas. *Adicciones, 36*(2), 121-128.

Fonseca-Pedrero, E., & Al-Halabí, S. (2025). *Salud mental en contextos educativos*. Pirámide.

Fonseca-Pedrero, E., Calvo, P., Díez-Gómez, A., Pérez-Albéniz, A., Lucas-Molina, B., & Al-Halabí, S. (2023a). *La salud mental de los adolescentes en contextos educativos: reflexiones derivadas del estudio PSICE*. Consejo General de la Psicología de España.

Fonseca-Pedrero, E., Díez-Gómez, A., Pérez-Albéniz, A., & Lucas-Molina, B. (2023b). Prevención de la conducta suicida en contextos educativos. In S. Al-Halabí & E. Fonseca-Pedrero (Eds.), *Manual de psicología de la conducta suicida* (pp. 199-233). Pirámide.

Fonseca-Pedrero, E., Díez-Gómez, A., Pérez-Albéniz, A., Lucas-Molina, B., Al-Halabí, S., & Calvo, P. (2023c). Profesionales de la psicología en contextos educativos: Una necesidad ineludible. *Papeles del Psicólogo, 44*(3), 112-124.

Fonseca-Pedrero, E., Falcó, R., Al-Halabí, S., & Muñiz, J. (2025). Evaluación de la salud mental en contextos educativos. In E. Fonseca-Pedrero & S. Al-Halabí (Eds.), *Manual de salud mental en contextos educativos*. Pirámide.

Fonseca-Pedrero, E., & Pérez-Albéniz, A. (2020). Evaluación de la conducta suicida en adolescentes: a propósito de la escala Paykel de Suicidio. *Papeles del Psicólogo, 41*(2), 106-115.

Fonseca-Pedrero, E., Pérez-Álvarez, M., Al-Halabí, S., Inchausti, F., López-Navarro, E. R., Muñiz, J., Lucas-Molina, B., Pérez-Albéniz, A., Rivera, R. B., Cano-Vindel, A., Gimeno-Peón, A., Prado, J., González-Menéndez, A., Valero, A. V., Priede, A., González-Blanch, C., Ruiz-Rodríguez, P., Moriana, J. A., Gómez, L. E., ... & Montoya-Castilla, I. (2021). Empirically supported psychological treatments for children and adolescents: State of the art. *Psicothema, 33*, 386-398.

Foulkes, L., & Stringaris, A. (2023). Do no harm: can school mental health interventions cause iatrogenic harm? *BJPsych Bulletin, 47*(5), 267–269.

Fusar-Poli, P. (2019). Integrated mental health services for the developmental period (0 to 25 years): a critical review of the evidence. *Frontiers in Psychiatry, 10*, 355.

Fusar-Poli, P., Correll, C. U., Arango, C., Berk, M., Patel, V., & Ioannidis, J. P. A. (2021). Pre-

ventive psychiatry: a blueprint for improving the mental health of young people. *World psychiatry, 20*(2), 200-221.

Gao, Y. X., Wang, J. Y., & Dong, G. H. (2022). The prevalence and possible risk factors of internet gaming disorder among adolescents and young adults: Systematic reviews and meta-analyses. *Journal of Psychiatric Research, 154*, 35-43.

García-Haro, J., García-Pascual, H., González-González, M., Barrio-Martínez, S., & García-Pascual, R. (2020). Suicide and mental disorder: a necessary critique. *Papeles del Psicólogo, 41*(1), 35-42.

García-Haro, J., González-González, M., Fonseca-Pedrero, E., & Al-Halabí, S. (2023). Conceptualización de la conducta suicida. In S. Al-Halabí & E. Fonseca-Pedrero (Eds.), *Manual de psicología de la conducta suicida* (pp. 31-68). Pirámide.

González-Bueso, V., Santamaría, J. J., Oliveras, I., Fernández, D., Montero, E., Baño, M., Jiménez-Murcia, S., Del Pino-Gutiérrez, A., & Ribas, J. (2020). Internet Gaming Disorder Clustering Based on Personality Traits in Adolescents, and Its Relation with Comorbid Psychological Symptoms. *International Journal of Environmental Research and Public Health, 17*(5), 1516.

Guinovart, M., Cobo, J., González-Rodríguez, A., Parra-Uribe, I., & Palao, D. (2023). Towards the Influence of Media on Suicidality: A Systematic Review of Netflix's 'Thirteen Reasons Why'. *International Journal of Environmental Research and Public Health, 20*(7), 5270.

Hao, F., Li, P., Liang, Z., & Geng, J. (2024). The association between childhood adverse experiences and internet addiction: A meta-analysis. *Acta Psychologica, 246,* 104270.

Hawton, K., Lascelles, K., Pitman, A., Gilbert, S., & Silverman, M. (2022). Assessment of suicide risk in mental health practice: Shifting from prediction to therapeutic assessment, formulation, and risk management. *The Lancet. Psychiatry, 9*(11), 922-928.

Hawton, K., & Sinyor, M. (2025). Suicide prevention: what works, what might work, and what does not work. *World psychiatry, 24*(1), 134-135.

Hswen, Y., Rubenzahl, L., & Bickham, D. S. (2014). Feasibility of an Online and Mobile Videogame Curriculum for Teaching Children Safe and Healthy Cellphone and Internet Behaviors. *Games For Health Journal, 3*(4), 252–259.

Hu, Y., Bai, Y., Pan, Y., & Li, S. (2021). Cyberbullying victimization and depression among adolescents: A meta-analysis. *Psychiatry research, 305*, 114198.

Institute of Medicine Committee on Prevention of Mental Disorders. (1994). *Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research*. National Academies Press.

Interian, A., Chesin, M., Kline, A., Miller, R., St Hill, L., Latorre, M., Shcherbakov, A., King, A., & Stanley, B. (2018). Use of the Columbia-Suicide Severity Rating Scale to Classify Suicidal Behaviors. *Archives of Suicide Research, 22*(2), 278–294.

Jiménez, T. I., Estévez-García, F., & Estévez, E. (2024). Suicidal behavior in adolescents: An ecological-relational study. *Psicothema, 36*(4), 389-402.

Khalaf, A. M., Alubied, A. A., Khalaf, A. M., & Rifaey, A. A. (2023). The Impact of Social Media on the Mental Health of Adolescents and Young Adults: A Systematic Review. *Cureus, 15*(8), e42990.

King, D. L., Herd, M. C., & Delfabbro, P. H. (2018). Motivational components of tolerance in internet gaming disorder. *Computers in Human Behavior, 78*, 133-141.

Kostyrka-Allchorne, K., Stoilova, M., Bourgaize, J., Rahali, M., Livingstone, S., & Sonuga-Barke, E. (2023). Review: Digital experiences and their impact on the lives of adolescents with pre-existing anxiety, depression, eating and nonsuicidal self-injury conditions - a systematic review. *Child and Adolescent Mental Health, 28*(1), 22–32.

Kristensen, J. H., Pallesen, S., Bauer, J., Leino, T., Griffiths, M. D., & Erevik, E. K. (2024). Suicidality among individuals with gambling problems: A meta-analytic literature review. *Psychological bulletin, 150*(1), 82-106.

Lim, K., Wong, C., McIntyre, R., Wang, J., Zhang, Z., Tran, B., Wanqiu, T., Ho, C., &

Ho, R. (2019). Global lifetime and 12-month prevalence of suicidal behavior, deliberate self-harm and non-suicidal self-injury in children and adolescents between 1989 and 2018: a meta-analysis. *International Journal of Environmental Research and Public Health, 16*(22), 4581.

Limone, P., Ragni, B., & Toto, G. A. (2023). The epidemiology and effects of video game addiction: A systematic review and meta-analysis. *Acta Psychologica, 241,* 104047.

Lindenberg, K., Halasy, K., & Schoenmaekers, S. (2017). A randomized efficacy trial of a cognitive-behavioral group intervention to prevent Internet Use Disorder onset in adolescents: The PROTECT study protocol. *Contemporary Clinical Trials Communications, 6,* 64-71.

Lindenberg, K., Kindt, S., & Szász-Janocha, C. (2020). *Internet addiction in adolescents: The PROTECT program for evidence-based prevention and treatment.* Springer Nature Switzerland AG.

Liu, R. T., Walsh, R. F. L., Sheehan, A. E., Cheek, S. M., & Sanzari, C. M. (2022). Prevalence and Correlates of Suicide and Nonsuicidal Self-injury in Children: A Systematic Review and Meta-analysis. *JAMA psychiatry, 79*(7), 718-726.

Loftus-Rattan, S. M., Wrightington, M., Furey, J., & Case, J. (2023). Multi-Tiered System of Supports: An Ecological Approach to School Psychology Service Delivery. *Teaching of Psychology, 50*(1), 77-85.

López-Fernández, F. J., Moreno-Amador, B., Falcó, R., Soto-Sanz, V., Marzo, J. C., Ibáñez, M. I., Cervin, M., & Piqueras, J. A. (2024). Suicidal behavior, mental health, and stressful life events among adolescents. *Psicothema, 36*(4), 351-360.

Marchant, A., Hawton, K., Stewart, A., Montgomery, P., Singaravelu, V., Lloyd, K., Purdy, N., Daine, K., & John, A. (2017). A systematic review of the relationship between internet use, self-harm and suicidal behaviour in young people: The good, the bad and the unknown. *PloS one, 12*(8), e0181722.

Mihara, S., & Higuchi, S. (2017). Cross-sectional and longitudinal epidemiological studies of Internet gaming disorder: A systematic review of the literature. *Psychiatry and Clinical Neurosciences, 71*(7), 425-444.

Montero-Marin, J., Allwood, M., Ball, S., Crane, C., De Wilde, K., Hinze, V., Jones, B., Lord, L., Nuthall, E., Raja, A., Taylor, L., Tudor, K., Blakemore, S. J., Byford, S., Dalgleish, T., Ford, T., Greenberg, M. T., Ukoumunne, O. C., Williams, J. M. G., & Kuyken, W. (2022). School-based mindfulness training in early adolescence: what works, for whom and how in the MYRIAD trial? *Evidence-Based Mental Health, 25*(3), 117-124.

Nesi, J., Burke, T. A., Bettis, A. H., Kudinova, A. Y., Thompson, E. C., MacPherson, H. A., Fox, K. A., Lawrence, H. R., Thomas, S. A., Wolff, J. C., Altemus, M. K., Soriano, S., & Liu, R. T. (2021). Social media use and self-injurious thoughts and behaviors: A systematic review and meta-analysis. *Clinical psychology review, 87,* 102038.

Niederkrotenthaler, T., Till, B., Kirchner, S., Sinyor, M., Braun, M., Pirkis, J., Tran, U. S., Voracek, M., Arendt, F., Ftanou, M., Kovacs, R., King, K., Schlichthorst, M., Stack, S., & Spittal, M. J. (2022). Effects of media stories of hope and recovery on suicidal ideation and help-seeking attitudes and intentions: systematic review and meta-analysis. *The Lancet. Public health, 7*(2), e156–e168.

O'Connor, R., & Pirkis, J. (2016). *The International Handbook of Suicide Prevention (2nd ed.)*. John Wiley & Sons.

Panchal, N., Cox, C., & Rudowitz, R. (2022). *The Landscape of School-Based Mental Health Services.* Kaiser Family Foundation.

Paykel, E. S., Myers, J. K., Lindenthal, J. J., & Tanner, J. (1974). Suicidal feelings in the general population: a prevalence study. *The British Journal of Psychiatry, 124,* 460-469.

Pérez-Sáenz, J. (2023). *Evaluación del uso problemático de internet en la adolescencia* [Doctoral Thesis]. University of La Rioja.

Piqueras, J. A., Marzo, J. C., Falcó, R., Moreno-Amador, B., Soto-Sanz, V., Rodríguez-Jiménez, T., & Rivera-Riquelme, M. (2022). Applications of Positive Psychology in Spain: Strengths-Based Interventions in

Diverse Spanish School Ecosystems. In K. Allen, M. J. Furlong, D. Vella-Brodrick, & S. M. Suldo (Eds.), *Handbook of Positive Psychology in Schools: Supporting Process and Practice* (pp. 478-492). Routledge.

Pirkis, J., Dandona, R., Silverman, M., Khan, M., & Hawton, K. (2024). Preventing suicide: a public health approach to a global problem. *The Lancet. Public health, 9*(10), e787–e795.

Posner, K., Brown, G. K., Stanley, B., Brent, D. A., Yershova, K. V., Oquendo, M. A., Currier, G. W., Melvin, G. A., Greenhill, L., Shen, S., & Mann, J. J. (2011). The Columbia-Suicide Severity Rating Scale: initial validity and internal consistency findings from three multisite studies with adolescents and adults. *The American Journal of Psychiatry, 168*(12), 1266–1277.

Richardson, R., Connell, T., Foster, M., Blamires, J., Keshoor, S., Moir, C., & Zeng, I. S. (2024). Risk and Protective Factors of Self-harm and Suicidality in Adolescents: An Umbrella Review with Meta-Analysis. *Journal of Youth and Adolescence, 53*(6), 1301-1322.

Saab, M. M., Murphy, M., Meehan, E., Dillon, C. B., O'Connell, S., Hegarty, J., Heffernan, S., Greaney, S., Kilty, C., Goodwin, J., Hartigan, I., O'Brien, M., Chambers, D., Twomey, U., & O'Donovan, A. (2022). Suicide and Self-Harm Risk Assessment: A Systematic Review of Prospective Research. *Archives of Suicide Research, 26*(4), 1645-1665.

Sanchez, A. L., Cornacchio, D., Poznanski, B., Golik, A. M., Chou, T., & Comer, J. S. (2018). The Effectiveness of School-Based Mental Health Services for Elementary-Aged Children: A Meta-Analysis. *Journal of the American Academy of Child and Adolescent Psychiatry, 57*, 153-165.

Schneider, L. A., King, D. L., & Delfabbro, P. H. (2017). Family factors in adolescent problematic Internet gaming: A systematic review. *Journal of Behavioral Addictions, 6*(3), 321-333.

Shannon, H., Bush, K., Villeneuve, P. J., Hellemans, K. G., & Guimond, S. (2022). Problematic Social Media Use in Adolescents and Young Adults: Systematic Review and Meta-analysis. *JMIR mental health, 9*(4), e33450.

Shek, D. T., Ma, H. K., & Sun, R. C. (2011). Development of a new curriculum in a positive youth development program: the project P.A.T.H.S. in Hong Kong. *The Scientific World Journal, 11*, 2207–2218.

Shek, D. T., Yu, L., Leung, H., Wu, F. K., & Law, M. Y. (2016). Development, implementation, and evaluation of a multi-addiction prevention program for primary school students in Hong Kong: the B.E.S.T. Teen Program. *Asian Journal of Gambling Issues And Public Health, 6*(1), 5.

Simões, C., Caravita, S., & Cefai, C. (2021). *A Systemic, Whole-School Approach to Mental Health and Well-Being in Schools in the EU: executive summary*. Publications Office of the European Union.

Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., Il Shin, J., Kirkbride, J. B., Jones, P., Kim, J. H., Kim, J. Y., Carvalho, A. F., Seeman, M. V., Correll, C. U., & Fusar-Poli, P. (2022). Age at onset of mental disorders worldwide: large-scale meta-analysis of 192 epidemiological studies. *Molecular Psychiatry, 27*(1), 281-295.

Spanish Government Delegation for the National Plan on Drugs. (2025). *Drug Demand Reduction Best Practices Portal* [Website]. Author.

Spanish National Statistics Institute. (2023). *Suicide deaths 2023: National results*. Author.

Spanish Observatory on Drugs and Addictions. (2023). *Report on Behavioral Addictions and Other Addictive Disorders 2023: Indicator admitted to treatment for behavioral addictions*. Ministry of Health. Government Delegation for the National Plan on Drugs.

Thompson, A. H., Dewa, C. S., & Phare, S. (2012). The suicidal process: age of onset and severity of suicidal behaviour. *Social Psychiatry and Psychiatric Epidemiology, 47*(8), 1263-1269.

Voss, C., Ollmann, T. M., Miché, M., Venz, J., Hoyer, J., Pieper, L., Höfler, M., & Beesdo-Baum, K. (2019). Prevalence, Onset, and Course of Suicidal Behavior Among Adolescents and Young Adults in Germany. *JAMA Network Open, 2*(10), e1914386.

Waite, M., & Atkinson, C. (2021). A review of mental health and wellbeing measures for universal secondary school screening. *Emotional and Behavioural Difficulties, 26*(2), 206-222.

Wang, P., Wang, Z., & Qiu, S. (2024). Universal, school-based transdiagnostic interventions to promote mental health and emotional wellbeing: a systematic review. *Child and Adolescent Psychiatry and Mental Health, 18*(1), 47.

Werner-Seidler, A., Spanos, S., Calear, A. L., Perry, Y., Torok, M., O'Dea, B., Christensen, H., & Newby, J. M. (2021). School-based depression and anxiety prevention programs: An updated systematic review and meta-analysis. *Clinical Psychology Review, 89,* 102079.

World Health Organization. (2014). *Preventing Suicide: A Global Imperative*. Author.

World Health Organization. (2021a). *Helping Adolescents Thrive Toolkit: Strategies to promote and protect adolescent mental health and reduce self-harm and other risk behaviours*. Author.

World Health Organization. (2021b). *Making every school a health-promoting school: implementation guidance*. Author.

World Health Organization. (2021c). *WHO guideline on school health services*. Author.

World Health Organization. (2023). *Suicide*. Author.

19

CLINICAL MANAGEMENT OF NON-SUBSTANCE ADDICTIONS: INTERVENTION STRATEGIES

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ABSTRACT:

Behavioral addictions are mental disorders whose diagnostic categorization has been recently recognized in major classification systems, concretely gambling disorder and gaming disorder. Complex, multifactorial, and heterogeneous in nature, these two disorders share some risk factors, psychobiological processes, and clinical profiles with other behavioral conditions like compulsive buying, internet/social media use or sex addiction. However, most behavioral addictions have not yet been formally recognized as independent diagnostic entities in major taxonomies, since an open debate regarding their characterization as addictive disorders exists and more empirical research is required. Therapy studies indicate that behavioral addictions generally show satisfactory outcomes, with cognitive-behavioral therapy being considered as the gold-standard empirically based intervention. Nonetheless, addictive conditions achieve relatively high likelihood of dropouts and relapses, especially during initial treatment stages and throughout follow-up after the interventions. In this regard, low motivation for change, age, longer duration of the disorder, comorbidity with other mental conditions, and low disorder awareness have been described as some of the factors that can modulate adherence and response to treatment. Additionally, pharmacological therapeutic intervention is still an emerging area, with less cumulated empirical evidence compared to psychological treatments. A current challenge in the field of behavioral addictions lies in improving therapeutic effectiveness through optimized clinical management from the initial stages of the problematic behaviour and this requires implementation of evidence-based clinical diagnostic and therapeutic protocols, focused on personalized approaches adapted to the specific needs of each patient (clinical history, exposure to risk factors, and phenotypic characteristics). This person-centered therapeutic perspective aims to identify homogeneous patient subtypes to predict effective treatment response. Further research with larger clinical samples is needed to evaluate predisposing and maintenance factors in the psychological, neurobiological, and social areas. These studies should include exhaustive screening and diagnostic protocols (standardized psychometric tools and structured clinical interviews) for early identification of high-risk individuals, mostly among vulnerable populations (e.g., adolescents and young adults, women, older adults, ethnic minorities, and patients with other comorbid disorders). The information recruited with these assessment tools should be the basis for designing effective individualized treatment programs.

KEYWORDS:

behavioral addiction, gambling disorder, gaming disorder, compulsive buying disorder, therapy

1. BEHAVIORAL ADDICTIONS: CONCEPTUALIZATION

Behavioral addictions involve a process characterized by the compulsion and diminished control to engage in a persistent rewarding non-substance-related behavior despite knowledge of adverse consequences. Although the behavior *per se* is not susceptible to being considered addictive, in a *behavioral addiction* the pattern(s) of behavior that subjects perform, with little or no control and oriented towards obtaining reinforcements, causes a significant impairment in the individuals' functioning (and also in their immediate social environment).

The pathogenesis of behavioral addictions involves two fundamental components: impulsivity and compulsivity, with the predominance of one or the other at different stages over the course of the addiction. These multidimensional constructs are characterized by aspects such as difficulty in self-control, seeking immediate gratification associated with reward, and behavioral motivation aimed at alleviating stress and/or avoiding unpleasant emotions (possibly resulting from maladaptive emotion regulation strategies).

In recent years, the diagnostic categorization of non-substance addictive disorders has undergone significant changes in the main taxonomic nosologies. However, we are in the early stages of this classification process and currently gambling disorder is the only behavioral addiction formally recognized within the "substance-related and other addictive disorders" in the latest edition of the *Diagnostic and Statistical Manual of Mental Disorders* by the American Psychiatric Association (DSM-5) (American Psychiatric Association (APA), 2013). Furthermore, the eleventh edition of the *International Classification of Diseases* by the World Health Organization (ICD-11) recognizes gaming disorder within its diagnostic categorization (World Health Organization (WHO), 2019). Other clinical conditions that share risk factors, clinical phenotypes, and treatment outcomes with gambling and gaming disorder are not yet considered as independent clinical entities in these mental disorder classifications due to the lack of empirical evidence. This would be the case, for example, with compulsive buying (Granero et al., 2016). While many

authors consider that this behavior could be explained according to the addiction model, there is still an open debate regarding its classification as an addiction, impulse control disorder, or within the obsessive-compulsive spectrum disorders.

Beyond diagnostic conceptualization issues, gambling disorder, gaming disorder, and other potential behavioral addictions constitute complex, multifactorial, and heterogeneous clinical processes associated with a strong egodystonic component, causing severe functional impairment (e.g., physical, mental, social, and even financial well-being). However, these behavioral problems, often accompanied by significant stigmatizing social attributions, are frequently underdiagnosed and undertreated. Globally, further research needs to address etiological aspects, diagnosis, and progression of these multiple clinical entities in order to protocolize standardized individualized empirical-based intervention plans.

2. ASSESSMENT AND DIAGNOSTIC OF BEHAVIORAL ADDICTIONS

2.1 Clinical assessment

The diagnosis of behavioral addictions is predominantly clinical, based on the criteria collected in major mental disorder diagnostic manuals (DSM and ICD) (APA, 2013; WHO, 2019). But scientific evidence supports that clinical assessment of behavioral addictions should encompass comprehensive consideration of multiple variables covering symptoms defining the addictive behavior itself, as well as other biological, psychological, and contextual features also closely related to the disorder.

Moreover, differential diagnosis with other disorders is important during clinical assessment. Thus, when assessing a gambling behavior, it is necessary to identify whether it is a case of problematic or pathological (addictive) behavior, the concurrence of personality disorders like antisocial personality disorder where gambling may involve illegal acts, or exclusive involvement due to acute affective episodes with manic characteristics. Similarly, in cases of gaming disorder, it is essential to differentiate between excessive and risky behavior, problematic, and addictive behavior. Besides the affective episodes, in the case of compulsive buying, conditions such as hoarding need to be ruled out. Overall, a basic exploration of the patient's psychopathological state at the time of the interview is also recommended.

Furthermore, evaluating the consequences of gambling behavior on the patient's environment is essential. In this vein, social and family functioning is considered to be deeply affected by the addiction-related problems, being the inclusion of concerned significant others identified as a significant predictor of effective treatment outcomes. Then, clinical assessment should also include the evaluation of family dynamics and other significant social relationships throughout, for example, information directly gathered from close family members.

Based on previous considerations, several structured clinical interviews have been developed for gambling disorder, such as the Diagnostic Interview for Gambling Severity (DIGS) (Winters et al., 1997), that allows a standardized evaluation of the gambling symptoms as well as other multiple risk factors (e.g., demographic, familial, and clinical features) strongly related to the onset and course of the disorder. In this context, for example, the protocolized therapeutic program for behavioral addictions developed by the Clinical Psychology Department at Bellvitge University Hospital in Spain (Jiménez-Murcia et al., 2006) includes a semi-structured clinical interview, which covers a general anamnesis of sociodemographic, physical state, and mental comorbid conditions, as well as other information regarding the onset and progression of the behavioral addiction, such as periods of exacerbation and potential associated factors (e.g., stressful life events, coping difficulties, or substance use, among others).

Finally, active listening to the patient's concerns, reasons for seeking help, and the initial goals, without judgment and acknowledging ambivalence in recognizing and changing problem behaviors, are key elements of motivational interviewing (Gómez-Peña et al., 2012; Miller & Rollnick, 2003). This strategy, widely used in substance addiction management, is also highly useful in assessing behavioral addictions by consolidating the therapeutic relationship and exploring motivation for behavior change by the patient themselves.

2.2 Psychometric assessment

The use of psychometric instruments in assessing patients with behavioral addictions complements clinical interviews, but it does not substitute them in any way. Different screening and diagnostic questionnaires have been developed and adapted to multiple countries. These psychometric tools include a set of items designed to explore symptoms considered in the diagnostic criteria, together with other psychological features implicated in the pathogenesis and course of the behavioral addictions, such as the evaluation of the psychopathological state, personality traits, impulsivity-compulsivity levels, emotional regulation, and coping skills, among others.

2.3 Longitudinal assessment

From clinical and research perspectives, monitoring short-term and long-term treatment responses in patients with behavioral addictions is essential. Hence, the treatment period should include a regular follow-up phase for monitoring the patient's state regarding addiction-related problems, but also the potential presence of risk factors that could lead to relapse. Personal and structural barriers that could impact maintaining abstinence should be identified, as well as their capacity to cope with stressors. If necessary, patients should be encouraged to employ strategies learned during the treatment process, such as cognitive restructuring strategies, relaxation, and assertiveness. Unfortunately, most studies only provide data on the immediate or short-term results of the interventions, and instrument evaluating middle to long-term therapeutic efficiency are scarce and not universally used (Pickering et al., 2018; Walker et al., 2006).

3. THERAPEUTIC MANAGEMENT OF BEHAVIORAL ADDICTIONS

The treatment of behavioral addictions has similarities with substance use disorders. Therapeutic approaches vary from professional treatment (inpatient and/or outpatient), which usually includes psychotherapy and/or pharmacotherapy; individual counselling, usually brief interventions aimed at assessment and psychoeducation, with modest and inconsistent effects over time; and self-help groups. For example, Gamblers Anonymous stands out as an intervention based on the Alcoholics Anonymous model, consisting of a 12-step fraternity program that involves regular attendance at group meetings and sponsorship. Despite having groups worldwide, its resonance is conditioned by cultural context, and the empirical effectiveness of this strategy is little known.

Overall, intervention strategies for behavioral addictions should be based on therapeutic plans that consider individual differences within patients, searching for personalized treatment, which in many cases requires a combination of different interventions.

3.1 Psychosocial strategies for gambling disorder

Epidemiological studies show that although gambling disorder is relatively frequent among the general population, and involves many negative outcomes (e.g., impaired functioning, elevated rates of comorbidities and reduced quality of life), this clinical condition is usually under-treated. Clinical settings warn that only around 10% of the patients with problematic or disordered gambling actively seek evidence-based treatment and that those individuals seeking treatment typically represent the most severe cases. Multiple reasons explain the low rates of treatment, such as social stigma (associated with moral weakness and perceived shame), lack of awareness, or even the relative low number of specialized health care services. Due to the presence of multiple barriers related to treatment access for people with gambling disorder, efforts are required for developing reliable tools aimed to identify people with these problems at the earliest states and better fit the contents of therapeutic programs.

Interventional programs for patients with gambling disorder can vary from completely self-directed approaches (workbooks or internet-based programs), to brief interventions (a phone call or a single face-to-face session, above all, focused on the population that may have positive screening, but are not actively seeking treatment), and the clinical intervention performed by experienced therapists. In this line, cognitive-behavioral therapy (CBT) is the most widely studied psychosocial intervention for gambling disorder (Moreira et al., 2024).

3.1.1 *Cognitive-behavioral therapy*

Psychological approach based on CBT is the most robust and evidence-based therapeutic strategy for many disorders, including gambling disorder (Cowlishaw et al., 2012; Free et al., 2024; Pfund et al., 2023). Both short-term and mid-term results support the efficacy of CBT in approaching gambling disorder (Di Nicola et al., 2020), with reported gambling abstinence rates exceeding 75% (Cowlishaw et al., 2012; Jiménez-Murcia et

al., 2007, 2015). At the end of treatment, rates of functional recovery vary between 40% and 90% approximately (Merkouris et al., 2016).

Different modalities exist, including individual and group forms. The first modality is usually indicated when psychopathology is present (e.g., psychiatric comorbidity of axis I and II and/or acute decompensation of the underlying disorder, with the exception of reactive adaptive disorders to the consequences of their gambling problem), certain aspects limiting understanding and/or active participation in treatment (e.g., language barriers, intellectual disability, any type of neurodevelopmental and/or neurological affectation with functional interference), lack of socio-familial support which could be involved in treatment through the co-therapist and/or preference of the patient.

The number of treatment sessions ranges from 4 to 20 depending on the intervention program, usually occurring on a weekly basis (Jiménez-Murcia et al., 2006; Petry et al., 2017). As an example, the protocolized therapeutic program for behavioral addictions of the Clinical Psychology Department at Bellvitge University Hospital in Spain (Jiménez-Murcia et al., 2006) considers both individual and group modalities of intervention, consisting of 16 weekly outpatient sessions, each one lasting 45 - 90 minutes (depending on the individual or group modality, respectively). In the case of group interventions, groups consist of 10-14 patients. In this specialized unit, the inclusion of a family member or close relative in treatment is considered (Gavriel-Fried et al., 2023; Jiménez-Murcia et al., 2017). This person has the role of a co-therapist, attending 7 out of the 16 sessions, specifically the first and second, fourth, seventh, tenth, thirteenth, and sixteenth, as well as the follow-up session.

CBT programs designed for gambling disorder deals with both cognitive and behavioral components specifically related to the aetiology of the disease, such as impulsive tendencies, cognitive biases, difficulties in emotion regulation, and other psychological related features (Free et al., 2024). This approach includes various techniques such as psychoeducation (e.g., risk factors associated with the onset and the progression of the disorder, description of the symptoms, etiological issues, developmental course, and description of the CBT program), response prevention (alternative and compensatory behaviors towards gambling), cognitive restructuring (aimed at identifying and modifying false beliefs about control over gambling), reinforcement and self-reinforcement, coping skills training, and strategies to prevent relapse. Considering that gambling disorder often entails financial difficulties, it is essential to include stimulus control strategies related to money management (e.g., carrying only a prearranged sum of money each day, requesting receipts for expenses, completing an expense logbook, reviewing accounts with the co-therapist) and avoiding possible triggers for gambling episodes and relapse. As part of these strategies, self-exclusion from offline and online gambling is also strongly recommended. All these measures should be flexible for each individual situation, depending on the patient's progress, with the inclusion of personalized stimulus control guidelines considering the functional analysis of the patient's gambling behavior (Jiménez-Murcia et al., 2006).

During all the therapy sessions, therapists should reinforce achieved abstinence of gambling and compliance with guidelines. In the presence of relapses, triggering factors should be analyzed, reinforcing the report of these episodes by the patients. It is also recommended to explore associated mood states, cognitions, and feelings of guilt, encouraging abstinence as the main therapeutic goal.

The global psychopathological state and the psychopathological stability of other comorbid conditions, including substance use, should also be monitored during treatment (Jiménez-Murcia et al., 2006). In this context, some patients seeking treatment for gambling disorder suffer from neurological conditions such as Parkinson's disease. For these cases, individualized interventions are required, with special attention to the specific factors associated with the neurological disease that may contribute to triggering and/or maintaining addiction-related problems (such as dopaminergic treatment, impulsivity, or lack of inhibitory control). The identification of alternative and adaptive leisure activities is reinforced among these patients, as well as the need for adherence to neurological follow-up, detection of specific risk situations and other impulsive behaviors, and coping with chronic medical conditions (Jiménez-Murcia et al., 2012; Sauvaget et al., 2017).

Other clinical assumptions also require adapting a standardized care protocol (Jiménez-Murcia et al., 2006). This is the case for groups such as youth and women. The recognition and inclusion of specific vulnerability factors, risk situations, and psychosocial factors (personality structure, emotional regulation and coping strategies, comorbid psychopathology, etc.), as well as idiosyncratic characteristics attributed to their social role that may influence the development of their addictive behavior could help patients to feel identified with the therapy context, favour the therapeutic bond, and improve adherence among those whose characteristics differ from the classic prototype of individuals with gambling disorder. As a result, these adaptations could contribute to reduce stigma associated with the disorder and the active search for new treatments.

Similarly, the rise in online gambling disorder has led to adaptations in treatment protocols, traditionally considering offline gambling. Once again, conceptual updating and familiarity with new modalities of addiction are useful, for example, in detecting specific risk situations or tackling cognitive distortions typical of different gambling modalities.

3.1.2 *Other psychosocial interventions*

While CBT is considered the first-line psychological intervention in gambling disorder, mostly due to having the most empirical evidence and acceptability (Cowlishaw et al., 2012; Potenza et al., 2019; Ribeiro et al., 2021), other approaches have also been described:

- Behavioral therapies. This approach includes strategies such as systematic desensitization in vivo, imagined desensitization, and exposure with response prevention.
- Cognitive therapies. This model includes rational emotive therapy, problem-solving training, cognitive restructuring techniques, and thought stopping.

- Treatments based on social approaches. These techniques are aimed at promoting changes in the individual's social environment, promoting the recovery of interpersonal relationships, and seeking adaptive reinforcements.
- Eye Movement Desensitization and Reprocessing Therapy (EMDR). This technique is potentially useful for patients with gambling disorder plus a history of trauma.
- Psychoeducation. This approach was initially employed in patients with low or middle gambling disorder severity, short progression of the problematic gambling, and high awareness of the gambling related problems. At present, psychoeducation is included within many CBT programs, taken during the first sessions of the intervention.
- Mindfulness. This therapy has proven efficacy for reducing the severity of gambling behavior and craving, reducing the rise in abstinence, and reducing emotional distress associated with the disease and its consequences (Sancho et al., 2018).
- Internet-based interventions and virtual reality applying CBT. This group could also include gamification, an approach that integrates gaming elements into non-game contexts.
- Others. Family therapy, couples therapy, and brief psychoanalytic therapy.

Certainly, some of these interventions such as cognitive therapy, Internet-based treatments, and mindfulness seem to show promising results that could help reduce the severity of the disorder and facilitate accessibility (Ribeiro et al., 2021). However, available studies are scarce, and results are mostly short-term. Although they are not currently considered first-line interventions in gambling disorder (Di Nicola et al., 2020; Potenza et al., 2019), their incorporation as part of a standardized treatment program has been recommended (Arias Horcajadas & Orio Ortiz, 2024).

In an increasingly globalized world, adapting the interventions for being employed online is an emerging need, since therapies may be performed even with exceptional environmental situations (such as the Covid-19 pandemic). In this regard, online intervention could contribute towards overcoming therapeutic barriers related to accessibility and flexibility, preserving confidentiality, and promoting cost minimization derived from the intervention. For this reason, it is important to study in detail the evidence of its efficacy for potential incorporation into clinical practice, as well as predictors of good outcomes for online treatments and the profile of patients that could particularly benefit from this type of therapeutic plan (Arias Horcajadas & Orio Ortiz, 2024; Pfund et al., 2020).

Furthermore, the incorporation of motivational strategies, such as those empirically based for treatment of substance-related disorders, have showed good effectiveness for gambling disorder (Di Nicola et al., 2020). Certainly, low motivation for change has been identified as a main predictor of poor response among patients with gambling disorder treated with CBT (Gómez-Peña et al., 2012; Jiménez-Murcia et al., 2007). The use of motivational strategies aims to improve the therapeutic bond and adherence, showing a beneficial effect in reducing both the frequency and severity of gambling behavior, as

well as improving the individual's psychological state (Cowlishaw et al., 2012; Moreira et al., 2024; Petry et al., 2017). Its effectiveness has been described in the short-term as a unique intervention and in combination with CBT, even though its superiority over CBT has not been demonstrated.

From a clinical perspective, the combination of CBT and motivational interventions could be particularly useful in patients with comorbidity with substance use disorders and in adolescent-youth population, due to their lower treatment motivation (Potenza et al., 2019). Moreover, a brief intervention based on motivational strategies could be valuable in individuals with subclinical problem gambling (Petry et al., 2017; Potenza et al., 2019). Motivational interventions have a series of characteristics that play an important role in the quality of the therapist-patient relationship: a) it is collaborative rather than directive (accepting the patient as they are, without judgment), b) it evokes the patient's own motivation instead of imposing it, and c) it accepts the individual's autonomy to make their own decisions (the therapist focuses on facilitating the emergence and verbalization of concerns from the patient). In this vein, these strategies have showed to improve the quality of the therapist-patient relationship, can favor patient involvement in treatment and the process of change, as well as increase self-efficacy perception (Jiménez-Murcia & Aymamí, 2015).

An example of the protocolized incorporation of this type of technique in clinical intervention with patients with gambling disorder is given by the the Clinical Psychology Department at Bellvitge University Hospital in Spain (Jiménez-Murcia et al., 2006). Their therapeutic protocols incorporate a motivational intervention module consisting of between two and five individual sessions, depending on the patient's case and evolution (Gómez-Peña et al., 2012; Jiménez-Murcia et al., 2006). The use of this module is implemented prior to the start of regular treatment in those cases where a marked lack of motivation and ambivalence is detected in the patient, which is likely to complicate achieving abstinence and/or its maintenance, as well as increasing the risk of treatment dropout and/or relapse. The application of this type of strategies follows the general principles of motivational intervention: expressing empathy, creating discrepancies, avoiding arguments, encouraging self-efficacy, and changing resistance (Miller & Rollnick, 2003).

Finally, it is worth mentioning that while psychosocial interventions based on CBT and motivational strategies could have greater efficacy compared to other therapeutic approaches in gambling disorder, further studies are needed to delve into the maintenance of their effects in the long-term, considering the limitation of longitudinal research incorporating follow-up data (Cowlishaw et al., 2012; Di Nicola et al., 2020; Yakovenko et al., 2015).

3.1.3 *Predictors of treatment outcome*

Treatment outcomes for gambling disorder are affected not only by the specific treatment provided, but also by other multiples factors. For CBT, variables positively associated

with poorer treatment response include disadvantaged socioeconomic contexts, worse psychopathological distress (e.g., higher likelihood of comorbid mental disorders), higher difficulties in emotion regulation, more dysfunctional personality traits (e.g., higher impulsivity levels) and impairment in neuropsychological performance, as well as a more severe gambling disorder (Jiménez-Murcia et al., 2007; Merkouris et al., 2016; Mestre-Bach & Potenza, 2023). However, clinical studies assessing the impact of aspects such as the duration of the disorder and its association with the severity and treatment response have shown mixed results (Merkouris et al., 2016; Roberts et al., 2020). Similarly, inconsistent results have been observed exploring the influence of the patients' sex and age on treatment response (Lucas et al., 2023; Merkouris et al., 2016; Potenza et al., 2019). Additionally, the strategic gambling modality has also been described as a predictor of poorer treatment response within the first years of disorder onset, compared to the non-strategic and mixed modality (i.e., preference for both gambling modalities) (Lucas et al., 2023).

A crucial issue of therapeutic studies is the operational definition for treatment outcome, and concretely the classification of good versus poor responses. Most published studies consider the presence of relapses and/or dropout from treatment programs as a poor outcome, but there is no consensus on the definition about what constitutes these constructs. For example, relapses are typically defined by the presence of any gambling episode/s once the intervention is started, but also for the return to the previous levels of gambling (the severity level at baseline). On the other hand, treatment dropout is generally defined as the discontinuation of a specific treatment program before being completed or, in the case of a pre-established protocol, not attending a specified number of sessions (Melville et al., 2007). CBT programs have showed dropout rates between 14% to 50%, with an average risk of 26% (Melville et al., 2007; Roberts et al., 2020). Moreover, the likelihood of both relapses and dropout seems to be higher during the initial sessions of CBT programs (Baño et al., 2021). Multiple sociodemographic, clinical, psychological, and neuropsychological factors have been explored as predictors of relapse and dropout in gambling disorder (Mestre-Bach & Potenza, 2023). Interestingly, different phenotypic profiles and developmental clinical trajectories have been identified in relation with CBT response among patients with gambling disorder, regarding characteristics such as sex, age group, or gambling modality, among others. Results evidence the heterogeneity of the disorder and the implication of the diverse factors on the progression of the disorder (Baño et al., 2021; Free et al., 2024; Granero et al., 2020; Jiménez-Murcia et al., 2019; Lara-Huallipe et al., 2021).

3.2 Psychosocial strategies for gaming disorder

Few studies have assessed psychological treatment of gaming disorder, and most of the available research is focused on CBT interventions (Danielsen et al., 2024; Goslar et al., 2019), bearing great similarity to the first-line treatment of gambling disorder and showing symptom reduction post-treatment and at 6-month follow-up. Nevertheless,

more studies are necessary to draw consistent conclusions (Danielsen et al., 2024; Arias Horcajadas & Orio Ortiz, 2024).

As an example of a clinical intervention in gaming disorder based on CBT, the Clinical Psychology Department at Bellvitge University Hospital in Spain (Jiménez-Murcia et al., 2006) includes a therapeutic program carried out on an outpatient and individual modality, that consists of 16 sessions, each lasting 45 minutes, with weekly frequency. This protocolized intervention incorporates the assessment and analysis of the problem, stimulus control and craving management, training in self-control techniques and in the healthy/adequate use of video games, promotion of leisure habits alternative to video games, relapse prevention training, encouragement of self-esteem, improvement of confidence, and family relationships. While in some cases the goal will be to achieve self-control in the use of video games, for those with greater clinical severity, complete abstinence from highly problematic video games is recommended.

Other psychological treatment approaches for gaming disorder include family therapy, eclectic psychotherapy (including CBT strategies, family therapy, solution-focused therapy, and motivational interviewing), and approaches known as "self-discovery camps for adolescents" (combining CBT, psychoeducation, conferences, personal counseling, and workshops) have obtained promising results in Asian countries, achieving significant reduction in total gaming time, as well as improvements in problem recognition and self-efficacy for positive change. Mindfulness has also shown decreases in cognitive distortions associated with the gaming behavior, with the consequent decrease in craving and the severity of the disorder. In the United States, treatment programs associated with hospitalization and residential settings have been described, with reSTART being one of the most well-known. Other manualized treatment programs, such as OMPRIS and PIPATIC, have been proposed (Mestre-Bach et al., 2022).

Despite the variety of treatment strategies described for gaming disorder, a consensus exists regarding the need of new empirical research to define the optimal duration of interventions, assessing the efficacy of the diverse formats (group versus individual, online versus offsite), including control groups, operative definition of treatment outcomes, and long-term longitudinal data.

3.3 Psychosocial strategies for compulsive buying

Currently, there is no standardized approach for the treatment of compulsive buying (Müller et al., 2023). So far, the approach with the most empirical-based evidence for compulsive buying is CBT (Goslar et al., 2020; Lourenço Leite et al., 2014; Müller et al., 2023; Vasiliu, 2022). Despite the low number of empirical studies valuing CBT among excessive buying (Müller et al., 2023), factors such as a more dysfunctional personality (e.g., high novelty and harm avoidance, plus low cooperativeness) and the presence of severe comorbid mental disorders have been identified as predictors of poorer treatment response (Granero et al., 2017).

In a clinical setting, some therapeutic objectives that have been recommended in the therapeutic management of compulsive buying include eliminating episodes of compulsive buying, controlling urgency and unhealthy habits related to excessive buying behaviors, cognitive restructuring of biased cognitions, developing more adaptive consumption habits, fostering self-esteem, increasing outcome expectations and self-efficacy, identifying risk factors that could impact relapses, and acquiring adaptive coping strategies when the urge/impulse to buy arises, as well as increasing confidence with the family (Jiménez-Murcia et al., 2006). In this disorder, the inclusion of exposure with response prevention has also been introduced as a valuable strategy (Jiménez-Murcia et al., 2006).

Apart from CBT, other proposed therapeutic interventions are based on self-help books or associations such as Debtors Anonymous (which provide a supportive environment for people who have accumulated large debts associated with problematic buying).

3.4 Follow-up after the end of treatment in behavioral addictions

The clinical follow-up of the patient once the strictly defined treatment period is completed is a key aspect that should be included in protocols for behavioral addiction interventions. This is particularly important considering addiction-related aspects such as the possibility of episodic courses, occasional setbacks and relapses, as well as the high frequency of comorbidities that can destabilize individuals over the course of their condition and affect the management of gambling behaviors, among others. From a clinical perspective, the inclusion of a follow-up period can be vital to reinforce aspects addressed during treatment, such as stimulus control and self-efficacy. It also serves to address relapse as a learning process, allowing for re-evaluation of the patient's contextual situation, identification of potential risk factors that have emerged during the disorder, and adjustment of other specific aspects in each case. Periodic sessions with the therapists (group or individual modality), and whether possible with the concerned significant other who helped as co-therapist in the treatment, should help evaluate and control the potential risk factors that could worsen psychological well-being, and aggravate the severity of the behavioral addiction (Jiménez-Murcia et al., 2006).

From a research perspective, follow-up allows for the evaluation of treatment response not only in the short-term but also in the medium and long-term, potentially identifying predictive factors for the course of the disorder, which could contribute to optimizing clinical intervention protocols. Regrettably, so far, there is no universal consensus upon duration for clinical follow-up.

3.5 Psychopharmacological interventions in behavioral addictions

The empirical research of the efficacy and tolerability of psychopharmacological treatment for behavioral addictions is in its early stages, and mixed results have been obtained from double-blind placebo-controlled trials. The differences in the methods (e.g., type of drugs used, dosage, or the large heterogeneity of the samples) have been related

with the inconsistent results. In this line, overall, results obtained comparing medication versus placebo have evidenced small effect sizes and short-term effects (Arias Horcajadas & Orio Ortiz, 2024).

Certainly, some benefits associated with certain psychopharmacological agents have been described among patients with gambling disorder, such as reduction in craving, the severity of the disorder, financial losses, or the improvement of comorbid conditions (Dowling et al., 2022). In this line, medications classically used for the treatment of substance-related disorders have been tested in this behavioral addiction, such as opioid receptor antagonists (naltrexone and nalmefene). These psychopharmacological strategies are the ones that have shown the most promising results so far, although alternative interventions with antidepressants and mood stabilizers have also been proposed (Goslar et al., 2019; Potenza et al., 2019). On the other hand, some natural or synthetic monoaminergic derivatives with primarily pro-dopaminergic effects have not obtained superiority over placebo, as have been observed in clinical trials with haloperidol, aripiprazole, Parkinson's disease treatment with levodopa, or after the administration of amphetamines. Indeed, in some cases, the administration of some of them, such as aripiprazole, has been associated with a behavioral exacerbation of the disorder. Another potential therapeutic target for gambling disorder seems to be the glutamatergic system. In this line, N-acetylcysteine (a modulator agent successfully used in substance-related disorders), has been tested as a complementary treatment to conventional psychological therapy, obtaining short-term improvements superior to placebo.

In the case of gaming disorder, medications used to address other psychiatric conditions such as depression and attention-deficit/hyperactivity disorder have also been tested (e.g., bupropion, escitalopram, methylphenidate, atomoxetine) with promising, but preliminary results (Zajac et al., 2017). Regarding compulsive buying, selective serotonin reuptake inhibitors (SSRIs) such as fluvoxamine, citalopram, escitalopram, and fluoxetine, other antidepressants (i.e., bupropion and nortriptyline), topiramate, memantine, as well as some opioid antagonists (naltrexone and nalmefene) have been used with potentially positive, but inconsistent findings (as a whole, no superiority versus placebo was reported).

In summary, no psychotropic medication has been specifically approved for the treatment of behavioral addictions and only preliminary empirical evidence is available. Nonetheless, in clinical practice, the combination of psychopharmacological and psychosocial interventions should be considered in some cases, especially for patients with other severe psychiatric comorbidities and/or for acute emotional distress reactive to the problematic addictive behavior and their consequences (Pettorruso et al., 2023). Therefore, a multidisciplinary and integrative approach should be guaranteed that considers the coordination among different professionals such as clinical psychologists, psychiatrists, nursing staff, social workers, and occupational therapists.

4. CONCLUSIONS

Despite behavioral addictions often achieving good therapy outcomes, only a limited percentage of individuals with gambling disorder, gaming addiction, or compulsive buying seek professional and specialized treatment. Furthermore, considering the likelihood of relapses and dropouts, the limited empirical evidence for some concrete treatment approaches (such as pharmacological strategies), and the few studies with long-term follow-up after treatment, it is essential to continue searching for treatments based on individual characteristics. From clinical and research perspectives, it is fundamental to recognize that behavioral addictions are highly heterogeneous disorders and differentiated subtypes should be identified, as well as clinical trajectories of treatment response in order to design more tailored interventions.

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REFERENCES

American Psychiatric Association (APA). (2013). *Diagnostic and Statistical Manual of Mental Disorders, (5th ed.): DSM-5*. American Psychiatric Association.

Arias Horcajadas, F., & Orio Ortiz, L. (2024). Guía clínica sobre adicciones comportamentales basada en la evidencia. Sociedad Científica Española de Estudios sobre el Alcohol, el Alcoholismo y otras Toxicomanías.

Baño, M., Mestre-Bach, G., Granero, R., Fernández-Aranda, F., Gómez-Peña, M., Moragas, L., Del Pino-Gutierrez, A., Codina, E., Guillén-Guzmán, E., Valero-Solís, S., Lizbeth Lara-Huallipe, M., Baenas, I., Mora-Maltas, B., Valenciano-Mendoza, E., Solé-Morata, N., Gálvez-Solé, L., González-Bueso, V., José Santamaría, J., Menchón, J. M., & Jiménez-Murcia, S. (2021). Women and gambling disorder: Assessing dropouts and relapses in cognitive behavioral group therapy. *Addictive Behaviors*, *123*, 107085. https://doi.org/10.1016/j.addbeh.2021.107085

Cowlishaw, S., Merkouris, S., Dowling, N., Anderson, C., Jackson, A., & Thomas, S. (2012). Psychological therapies for pathological and problem gambling. *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.CD008937.pub2

Danielsen, P. A., Mentzoni, R. A., & Låg, T. (2024). Treatment effects of therapeutic interventions for gaming disorder: A systematic review and meta-analysis. In *Addictive Behaviors*. https://doi.org/10.1016/j.addbeh.2023.107887

Di Nicola, M., De Crescenzo, F., D'Alò, G. L., Remondi, C., Panaccione, I., Moccia, L., Molinaro, M., Dattoli, L., Lauriola, A., Martinelli, S., Giuseppin, G., Maisto, F., Crosta, M. L., Di Pietro, S., Amato, L., & Janiri, L. (2020). Pharmacological and Psychosocial Treatment of Adults With Gambling Disorder: A Meta-Review. *Journal of Addiction Medicine*, *14*(4), e15–e23. https://doi.org/10.1097/ADM.0000000000000574

Dowling, N., Merkouris, S., Lubman, D., Thomas, S., Bowden-Jones, H., & Cowlishaw, S. (2022). Pharmacological interventions for the treatment of disordered and problem gambling. *Cochrane Database of Systematic Reviews*, *2022*(9). https://doi.org/10.1002/14651858.CD008936.pub2

Free, B. L., Halle Smith, E., Ginley, M. K., Whelan, J. P., & Pfund, R. A. (2024). Does cognitive-behavioral treatment affect putative mechanisms of change among individuals with problem gambling? A systematic review and exploratory meta-analysis. *Addictive Behaviors*, *158*(July), 108110. https://doi.org/10.1016/j.addbeh.2024.108110

Gavriel-Fried, B., Vana, N., Mestre-Bach, G., Granero, R., Fernández-Aranda, F., & Jiménez-Murcia, S. (2023). Differences in Gambling Disorder Recovery Capital Toolkits in Mothers Versus Childless Women. *American Journal of Orthopsychiatry*. https://doi.org/10.1037/ort0000699

Gómez-Peña, M., Penelo, E., Granero, R., Fernández-Aranda, F., Álvarez-Moya, E., Santamaría, J. J., Moragas, L., Neus Aymamí, M., Gunnard, K., Menchón, J. M., & Jimenez-Murcia, S. (2012). Correlates of Motivation to Change in Pathological Gamblers Completing Cognitive-Behavioral Group Therapy. *Journal of Clinical Psychology*, *68*(7), 732–744. https://doi.org/10.1002/jclp.21867

Goslar, M., Leibetseder, M., Muench, H. M., Hofmann, S. G., & Laireiter, A.-R. (2019). Pharmacological Treatments for Disordered Gambling: A Meta-analysis. *Journal of Gambling Studies*, *35*(2), 415–445. https://doi.org/10.1007/s10899-018-09815-y

Goslar, M., Leibetseder, M., Muench, H. M., Hofmann, S. G., & Laireiter, A. R. (2020). Treatments for internet addiction, sex addiction and compulsive buying: A meta-analysis. In *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2020.00005

Granero, R., Fernández-Aranda, F., Mestre-Bach, G., Steward, T., Baño, M., Agüera, Z., Mallorquí-Bagué, N., Aymamí, N., Gómez-Peña, M., Sancho, M., Sánchez, I., Menchón, J. M., Martín-Romera, V., & Jiménez-Murcia,

S. (2017). Cognitive behavioral therapy for compulsive buying behavior: Predictors of treatment outcome. *European Psychiatry*. https://doi.org/10.1016/j.eurpsy.2016.06.004

Granero, Roser, Fernández-Aranda, F., Mestre-Bach, G., Steward, T., Baño, M., del Pino-Gutiérrez, A., Moragas, L., Mallorquí-Bagué, N., Aymamí, N., Gómez-Peña, M., Tárrega, S., Menchón, J. M., & Jiménez-Murcia, S. (2016). Compulsive Buying Behavior: Clinical Comparison with Other Behavioral Addictions. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.00914

Granero, Roser, Valero-Solis, S., Fernández-Aranda, F., Gómez-Peña, M., Moragas, L., Mena-Moreno, T., Pino-Gutierrez, A. del, Codina, E., Martín-Romera, V., Casalé, G., Agüera, Z., Baenas-Soto, I., Valenciano-Mendoza, E., Mora-Maltas, B., Sánchez, I., Lozano-Madrid, M., Menchón, J. M., & Murcia, S. J. (2020). Response trajectories of gambling severity after cognitive behavioral therapy in young-adult pathological gamblers. *Journal of Behavioral Addictions*, *9*(1), 140–152. https://doi.org/10.1556/2006.2020.00008

Jiménez-Murcia, S., Aymamí-Sanromà, M., Gómez-Pena, M., Álvarez-Moya, E., & Vallejo, J. (2006). *Protocols de tractament cognitivoconductual pel joc patològic i d'altres addiccions no tòxiques [Protocols of cognitive-behaviour therapy for pathological gambling and other behavioural addictions]*.

Jiménez-Murcia, S., Álvarez-Moya, E. M., Granero, R., Aymami, M. N., Gómez-Peña, M., Jaurrieta, N., Sans, B., Rodriguez-Marti, J., & Vallejo, J. (2007). Cognitive-behavioral group treatment for pathological gambling: Analysis of effectiveness and predictors of therapy outcome. *Psychotherapy Research*. https://doi.org/10.1080/10503300601158822

Jiménez-Murcia, S., Bove, F. I., Israel, M., Steiger, H., Fernández-Aranda, F., Álvarez-Moya, E., Granero, R., Penelo, E., Vergé, B., Aymamí, M. N., Santamaría, J. J., Gómez-Peña, M., Moragas, L., Savvidou, L. G., & Menchón, J. M. (2012). Cognitive-behavioral therapy for pathological gambling in parkinson's disease: A pilot controlled study. *European Addiction Research*. https://doi.org/10.1159/000337442

Jiménez-Murcia, S., Granero, R., Fernández-Aranda, F., Arcelus, J., Aymamí, M. N., Gómez-Peña, M., Tárrega, S., Moragas, L., Del Pino-Gutiérrez, A., Sauchelli, S., Fagundo, A. B., Brewin, N., & Menchón, J. M. (2015). Predictors of Outcome among Pathological Gamblers Receiving Cognitive Behavioral Group Therapy. *European Addiction Research*, *21*(4), 169–178. https://doi.org/10.1159/000369528

Jiménez-Murcia, S., Granero, R., Fernández-Aranda, F., Aymamí, N., Gómez-Peña, M., Mestre-Bach, G., Steward, T., Del Pino-Gutiérrez, A., Mena-Moreno, T., Vintró-Alcaraz, C., Agüera, Z., Sánchez-González, J., Moragas, L., Codina, E., & Menchón, J. M. (2019). Developmental trajectories of gambling severity after cognitive-behavioral therapy. *European Psychiatry : The Journal of the Association of European Psychiatrists*, *60*, 28–40. https://doi.org/10.1016/j.eurpsy.2019.04.001

Jiménez-Murcia, S., Tremblay, J., Stinchfield, R., Granero, R., Fernández-Aranda, F., Mestre-Bach, G., Steward, T., del Pino-Gutiérrez, A., Baño, M., Moragas, L., Aymamí, N., Gómez-Peña, M., Tárrega, S., Valenciano-Mendoza, E., Giroux, I., Sancho, M., Sánchez, I., Mallorquí-Bagué, N., González, V., … Menchón, J. M. (2017). The Involvement of a Concerned Significant Other in Gambling Disorder Treatment Outcome. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-016-9657-z

Jiménez-Murcia S, Aymamí., M. (2015). Trastornos del Control de Impulsos: Juego Patológico. In J. Vallejo-Ruiloba (Ed.), *Introducción a la psicopatología y la psiquiatría* (8th ed., pp. p433-453). Elsevier Masson.

Lara-Huallipe, M. L., Granero, R., Fernández-Aranda, F., Gómez-Peña, M., Moragas, L., del Pino-Gutierrez, A., Valenciano-Mendoza, E., Mora-Maltas, B., Baenas, I., Etxandi, M., Menchón, J. M., & Jiménez-Murcia, S. (2021). Clustering Treatment Outcomes in Women with Gambling Disorder. *Journal of Gambling Studies*, *38*(4), 1469–1491. https://doi.org/10.1007/s10899-021-10092-5

Lourenço Leite, P., Pereira, V. M., Nardi, A. E., & Silva, A. C. (2014). Psychotherapy for compulsive buying disorder: A systematic review. *Psychiatry Research*, *219*(3), 411–419. https://doi.org/10.1016/j.psychres.2014.05.037

Lucas, I., Granero, R., Fernández-Aranda, F., Solé-Morata, N., Demetrovics, Z., Baenas, I., Gómez-Peña, M., Moragas, L., Mora-Maltas, B., Lara-Huallipe, M. L., & Jiménez-Murcia, S. (2023). Gambling disorder duration and cognitive behavioural therapy outcome considering gambling preference and sex. *Journal of Psychiatric Research*, *158*, 341–349. https://doi.org/10.1016/j.jpsychires.2022.12.031

Melville, K. M., Casey, L. M., & Kavanagh, D. J. (2007). Psychological treatment dropout among pathological gamblers. *Clinical Psychology Review*, *27*(8), 944–958. https://doi.org/10.1016/j.cpr.2007.02.004

Merkouris, S. S., Thomas, S. A., Browning, C. J., & Dowling, N. A. (2016). Predictors of outcomes of psychological treatments for disordered gambling: A systematic review. *Clinical Psychology Review*, *48*, 7–31. https://doi.org/10.1016/j.cpr.2016.06.004

Mestre-Bach, G., Fernandez-Aranda, F., & Jiménez-Murcia, S. (2022). Exploring Internet gaming disorder: an updated perspective of empirical evidence (from 2016 to 2021). *Comprehensive Psychiatry*, *116*, 152319. https://doi.org/10.1016/j.comppsych.2022.152319

Mestre-Bach, G., & Potenza, M. N. (2023). Features Linked to Treatment Outcomes in Behavioral Addictions and Related Disorders. *International Journal of Environmental Research and Public Health*, *20*(4), 2873. https://doi.org/10.3390/ijerph20042873

Miller, W., & Rollnick, S. (2003). Motivational Interviewing: Preparing People for Change, 2nd ed. *Journal For Healthcare Quality*, *25*(3), 46. https://doi.org/10.1097/01445442-200305000-00013

Moreira, D., Dias, P., Azeredo, A., Rodrigues, A., & Leite, Â. (2024). A Systematic Review on Intervention Treatment in Pathological Gambling. *International Journal of Environmental Research and Public Health*, *21*(3), 346. https://doi.org/10.3390/ijerph21030346

Müller, A., Laskowski, N. M., Thomas, T. A., Antons, S., Tahmassebi, N., Steins-Loeber, S., Brand, M., & Georgiadou, E. (2023). Update on treatment studies for compulsive buying-shopping disorder: A systematic review. In *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2023.00033

Petry, N. M., Ginley, M. K., & Rash, C. J. (2017). A systematic review of treatments for problem gambling. *Psychology of Addictive Behaviors*, *31*(8), 951–961. https://doi.org/10.1037/adb0000290

Pettorruso, M., Di Carlo, F., Romeo, V. M., Jimenez-Murcia, S., Grant, J. E., Martinotti, G., & Di Giannantonio, M. (2023). The pharmacological management of gambling disorder: if, when, and how. *Expert Opinion on Pharmacotherapy*, *24*(4), 419–423. https://doi.org/10.1080/14656566.2023.2172329

Pfund, R. A., Ginley, M. K., Kim, H. S., Boness, C. L., Horn, T. L., & Whelan, J. P. (2023). Cognitive-behavioral treatment for gambling harm: Umbrella review and meta-analysis. In *Clinical Psychology Review*. https://doi.org/10.1016/j.cpr.2023.102336

Pfund, R. A., Peter, S. C., Whelan, J. P., Meyers, A. W., Ginley, M. K., & Relyea, G. (2020). Is more better? A meta-analysis of dose and efficacy in face-to-face psychological treatments for problem and disordered gambling. *Psychology of Addictive Behaviors*, *34*(5), 557–568. https://doi.org/10.1037/adb0000560

Pickering, D., Keen, B., Entwistle, G., & Blaszczynski, A. (2018). Measuring treatment outcomes in gambling disorders: a systematic review. In *Addiction*. https://doi.org/10.1111/add.13968

Potenza, M. N., Balodis, I. M., Derevensky, J., Grant, J. E., Petry, N. M., Verdejo-Garcia, A., & Yip, S. W. (2019). Gambling disorder. *Nature Reviews. Disease Primers*, *5*(1), 51. https://doi.org/10.1038/s41572-019-0099-7

Ribeiro, E. O., Afonso, N. H., & Morgado, P. (2021). Non-pharmacological treatment of gambling disorder: a systematic review of randomized controlled trials. *BMC Psychiatry*, *21*(1), 105. https://doi.org/10.1186/s12888-021-03097-2

Roberts, A., Murphy, R., Turner, J., & Sharman, S. (2020). Predictors of Dropout in Disordered Gamblers in UK Residential Treatment. *Journal of Gambling Studies*, *36*(1), 373–386. https://doi.org/10.1007/s10899-019-09876-7

Sancho, M., De Gracia, M., Rodríguez, R. C., Mallorquí-Bagué, N., Sánchez-González, J., Trujols, J., Sánchez, I., Jiménez-Murcia, S., & Menchón, J. M. (2018). Mindfulness-Based Interventions for the Treatment of Substance and Behavioral Addictions: A Systematic Review. *Frontiers in Psychiatry*, *9*, 95. https://doi.org/10.3389/fpsyt.2018.00095

Sauvaget, A., Jiménez-Murcia, S., Fernández-Aranda, F., Granero, R., Grall-Bronnec, M., Victorri-Vigneau, C., Bulteau, S., Derkinderen, P., Vanelle, J. M., Hakansson, A., Mestre-Bach, G., Steward, T., & Menchón, J. M. (2017). A comparison of treatment-seeking behavioral addiction patients with and without Parkinson's disease. *Frontiers in Psychiatry*. https://doi.org/10.3389/fpsyt.2017.00214

Vasiliu, O. (2022). Therapeutic management of buying/shopping disorder: A systematic literature review and evidence-based recommendations. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.1047280

Walker, M., Toneatto, T., Potenza, M. N., Petry, N., Ladouceur, R., Hodgins, D. C., El-Guebaly, N., Echeburua, E., & Blaszczynski, A. (2006). A framework for reporting outcomes in problem gambling treatment research: The Banff, Alberta Consensus. *Addiction*. https://doi.org/10.1111/j.1360-0443.2005.01341.x

Winters, K. C., Specker S., y Stinchfield, R. D. (1997). *Diagnostic Interview for Gambling Severity (DIGS)*. University of Minnesota, Medical School.

World Health Organization (WHO). (2019). *International Classification of Diseases, (11th ed.)*: ICD-11. World Health Organization.

Yakovenko, I., Quigley, L., Hemmelgarn, B. R., Hodgins, D. C., & Ronksley, P. (2015). The efficacy of motivational interviewing for disordered gambling: Systematic review and meta-analysis. *Addictive Behaviors*, *43*, 72–82. https://doi.org/10.1016/j.addbeh.2014.12.011

Zajac, K., Ginley, M. K., Chang, R., & Petry, N. M. (2017). Treatments for Internet gaming disorder and Internet addiction: A systematic review. *Psychology of Addictive Behaviors*, *31*(8), 979–994. https://doi.org/10.1037/adb0000315

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ADOLESCENTS WITH GAMING PROBLEMS, AND THEIR PARENTS: RESEARCH, THERAPY, AND RECOMMENDATIONS

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ABSTRACT:

For some adolescents, playing video games may become problematic. Problematic gaming (PG) is defined by continuation of the gaming activities despite functional impairment in the personal, social, and educational domains. Our message in this chapter is that PG can be remedied by professional interventions and parental actions. There are risk factors enhancing the odds that PG develops and factors that protect against PG. One class of risk/protective factors are intrapersonal (individual) characteristics of the adolescent. Adolescent PG is also linked to interpersonal factors, e.g., pertaining to the parents and the family. Parental and family characteristics increasing the odds that the teen will develop PG, include problems the parents face themselves (addiction, mental disorder), inadequate parenting style, and poor attachment and communication between the family members. The impact of parental and family factors suggests that family therapy may be helpful in treating adolescent PG. One family therapy focusing on both intrapersonal and interpersonal factors is Multidimensional Family Therapy (MDFT), a treatment originally designed for substance abusing and delinquent youth. We adapted MDFT for use in PG by formulating PG-specific therapeutic goals and by adding interventions such as having the adolescent play games in sessions with the participation of the therapist and the parents. We review here the outcomes of a randomized controlled trial comparing PG-adapted MDFT —named STANDUP (Systemic Therapy for AdolesceNts with Digital Use Problems)— with family therapy as usual. Family therapy, especially STANDUP, significantly reduced problematic gaming in PG youth and had positive effects on mental health, quality of life, and school performance. The chapter closes with recommendations for therapists and parents and with notes on how to implement an adolescent PG treatment programme.

KEYWORDS:

gaming disorder, adolescents, parents, therapy

1. INTRODUCTION

There was a time when there was no Internet. Smartphones had not hit the markets yet. Internet gaming did not exist. Worries about harmful screen use by young people remained limited to concerns about the time they spent in front of television sets.

Back then we, —the authors of this chapter— were working in addiction care for youth with substance use disorders. European Health Ministries were worried about signs of a rise in cannabis use disorder among adolescents. At the turn of the century, five countries —Germany, France, Belgium, the Netherlands, and Switzerland— teamed up in a research programme called INCANT (International Cannabis Need of Treatment). INCANT's main aim was to select, evaluate and implement a treatment programme for cannabis use disorder in adolescents. Based on the available scientific evidence, Multidimensional Family Therapy (MDFT) was chosen. In American studies, MDFT had been found to mitigate substance use disorders, while also having positive effects on mental comorbidity, delinquency, and family harmony.

In each of the five countries, teams of therapists were trained in MDFT. Adolescents with cannabis use disorder were randomly assigned to MDFT or to the locally most prevalent type of individual treatment, which was mainly based on cognitive-behavioural therapy. MDFT outperformed the comparison treatment in reducing cannabis use disorder and in improving mental health. Among both adolescents and their parents, MDFT increased treatment engagement and treatment retention rates, confirming American findings (Rigter et al., 2013; Schaub et al., 2014).

Having a treatment for cannabis use disorder was welcome. However, European addiction treatment agencies soon had to face new challenges. For instance, from 2005 onwards, our own treatment centre in Geneva (P. Nielsen) received requests, from parents, to help their "cyberaddicted" teens. These youth were hooked on the early versions of Counter-Strike and World of Warcraft. Their gaming behaviour was not only straining family relationships but was also harming the youth themselves in personal,

social, or educational respects. Like five years earlier for cannabis, we felt empty-handed; there was no evidence-based treatment for troubled gaming we could offer at the time.

We were struck by two clinically relevant similarities between the families of cannabis using teens and teens with gaming problems: hard-to-reach adolescents, and exhausted, discouraged parents desperately looking for a way forward. Therefore, we examined whether MDFT could also serve as a treatment for adolescents with gaming problems. We embarked on a new research journey, on which we report here.

2. PROBLEMATIC GAMING IN ADOLESCENTS: TERMINOLOGY

Video gaming is a popular source of entertainment. For most players, gaming is fun but for a vulnerable minority of them it may become harmful, problematic.

In the literature, problematic gaming is often called gaming addiction. Researchers may be too quick in labelling behaviours as being addictive, though. In the classification systems of the World Health Organization (ICD-11) and the American Psychiatric Association (DSM-5), the word 'addiction' has been replaced by 'disorder'. According to ICD-11, gaming disorder is characterized by three criteria: (1) The player's control over gaming is impaired, (2) the player gives increasing priority to gaming over other activities, and (3) continues or steps up gaming despite being aware this may be harmful. Consequently, (4) the gaming behaviour affects personal, family, social, educational, or occupational functioning (World Health Organization, 2019). DSM-5 lists Internet gaming disorder (IGD) as a tentative disorder requiring further research (APA, 2013). To diagnose Internet gaming disorder, at least five out of a total of nine DSM-5 criteria must be met. Four of the DSM-5 criteria match the ICD-11 criteria.

There is limited consensus about the diagnostic validity, clinical utility, and prognostic value of at least some of the (Internet) gaming disorder criteria (Castro-Calvo et al., 2021). To steer away from the current debate about the status of (Internet) gaming disorder, we use here the term 'problematic gaming' (PG), which includes all gaming behaviour having harmful impact on the player's functioning and development (Mannikko et al., 2020).

3. RISK AND PROTECTIVE FACTORS FOR PROBLEMATIC GAMING IN ADOLESCENTS

Key to understanding the nature of PG in teens is tracing the conditions in which PG arises. Which risk factors and which protective factors are linked to adolescent PG? We need this information to design interventions for preventing and treating PG.

Most research on PG risk and protective factors has focused on intrapersonal (individual) characteristics of the teen. These include personality traits, mental health conditions, cognitive functions, and other youth-related variables. Intrapersonal factors

most clearly correlated with PG are loneliness, low social competence, control/regulation difficulties, anger/hostility, depression and anxiety, sensation seeking, and ADHD (Gao, Wang, & Dong, 2022; Zhuang et al., 2023) (Table 1).

Adolescent PG is also linked to interpersonal factors, such as features of the family, the school, and the social setting (Mannikko et al., 2020; Paulus et al., 2018; Richard et al., 2020; Zajac et al., 2024). This lends credence to a multidimensional model of PG in adolescents, viewing this behavioural pattern as a clinical phenomenon shaped by interactive intrapersonal, proximal (parent and family) and more distal (e.g., school, peers) factors that heighten or lower the risk of developing PG (Domoff et al., 2020; Granic et al., 2020).

In our own investigations, limited to parental and family (PF) factors (Nielsen, Favez, & Rigter, 2020), we distinguished six types of PF factors with potential impact on adolescent PG: problems faced by the parent(s), child abuse, co-parental teamwork, parenting style, family attachment, and family functioning (Table 1).

We collapsed PF factors into four categories: (1) positive parenting (positive parenting style and positive co-parental teamwork), (2) negative parenting (negative style and teamwork; child abuse; problems of the parents), (3) positive family dynamics (secure family attachment and positive family functioning), and (4) negative family dynamics (insecure family attachment and negative family functioning). Across the studies we sampled for a systematic literature review, positive parenting and positive family functioning were associated with lower rates of PG in youth, and negative parenting and negative family functioning with higher PG rates (Nielsen et al., 2020). The effect sizes of the links between PF factors and PG rate, mainly small to medium, were of similar magnitude as those of the intrapersonal factors listed in Table 1.

Table 1. *Intrapersonal and Parent and Family Factors Linked to Problematic Gaming in Adolescents*

Source of factors	Risk factors	Protective factors
	Intrapersonal factors	
Intrapersonal	Loneliness Low social competence Low self-esteem Control/regulation difficulties Anger/hostility Depression/anxiety Sensation-seeking tendencies ADHD	Good social skills High self-esteem, solid self-identity High control regulation High emotion regulation skills
	Parental and family factors	
Problems faced by the parent(s)	Mental disorder Substance use disorder	
Child abuse	Mental or physical abuse Neglect	
Co-parental teamwork	Discordant Conflictive	Collaborative Supportive

Source of factors	Risk factors	Protective factors
Parenting style	Uninvolved Neglectful Permissive/indulgent Authoritarian	Authoritative
Family attachment	Poor/conflictual attachment Low emotional availability	Secure parent-child relationship
Family functioning	Lack of home rules Lack of family rituals Disorganized family Poor communication between family members	Endorsed home rules present Family rituals present Well-organized family Warm, supportive, and frequent communication between family members

4. IMPLICATIONS FOR TREATING ADOLESCENTS WITH GAMING PROBLEMS

Which treatment approaches are helpful in countering PG? Studies addressing this question are wanting. With intrapersonal risk and protective factors at play, one might consider offering a therapy targeting just the youth, such as cognitive behavioural therapy (CBT). Treatment studies with CBT have yielded mixed results. Overall, CBT may have some positive effect on PG (Zajac et al., 2024) but the effect is small and we do not know if it is durable. Unfortunately, most investigations conducted so far lacked adequate follow-up measurements and were also marred by other study quality issues (Stevens et al., 2019).

The importance of parental and family factors suggests that family therapy may be of benefit in treating PG adolescents. However, the family therapy to be chosen should take into regard intrapersonal factors as well. Combining both domains —intrapersonal and interpersonal— is likely to boost treatment effectiveness. Recent meta-analyses and literature reviews have shown that involving parents in treatments targeting youth improves therapy outcomes (Esteban et al., 2023; Pine et al., 2024; Seidel et al., 2024).

One family therapy focusing on both intrapersonal and interpersonal factors is MDFT. MDFT offers three types of sessions, i.e., with just the youth, with just the parents, and with the family (youth and parents). Sessions can have multiple aims, e.g., working on intrapersonal issues in sessions with the youth while also using these sessions to prepare the teens for upcoming family sessions (Liddle & Rigter, 2013).

5. ADAPTATION OF MDFT FOR TREATING ADOLESCENTS WITH GAMING PROBLEMS

MDFT is an evidence-based therapy developed to treat drug using and delinquent adolescents. A key document in MDFT training and practice is the MDFT manual (Liddle,

2002). For each new adaptation of MDFT, the manual is left intact as much as possible. Parts of it are adjusted, to adequately serve the needs of the new target group. We mention here some of the adaptations we carried through for PG (Nielsen et al., 2023).

One adaptation concerns the goal of treatment as regards the problem behaviour of the youth. When MDFT is applied to treat a substance abusing adolescent, its aim is to prevent relapse of abuse of alcohol or drugs by achieving abstinence, or at least by reducing use of the substance. In contrast, achieving abstinence —stop gaming altogether— is not necessarily the optimal path to follow in PG treatment. Gaming is not just harmful to the adolescent, it also yields advantages, such as pleasure, learning skills, self-esteem, allowing social interactions, and gaining a sense of autonomy (Granic et al., 2014; Nielsen et al., 2023; Przybylski et al., 2010). Such advantages get lost if the youth is urged to abandon gaming. The goal in PG treatment should be to turn harmfully playing gamers into gamers able to cope with the challenges of advancing from adolescence to adulthood, a crucial stage of life development. The aim of treatment should therefore be to stop PG but necessarily not at the expense of all gaming.

A second adaptation was the introduction of in-session gaming as an assessment and intervention tool (Nielsen et al., 2023); see below. Taken together, these —and other— adaptations were synthesized in a treatment module named STANDUP: Systemic Therapy for AdolesceNts with Digital Use Problems (Nielsen & Rigter, 2026)

6. THE START OF THERAPY. BUILDING THERAPEUTIC ALLIANCES AND BOOSTING TREATMENT MOTIVATION

6.1 Adolescents

In all applications of MDFT, most youth showing problem behaviour lack clear motivation to start and complete treatment. This is also true of PG adolescents. In our own experience in Geneva, Switzerland, most PG teens grudgingly turning up at the treatment centre were coerced to come by their parents (28% of cases) or school (29%) or were referred by another treatment agency (24%) (Nielsen, 2021; Nielsen et al., 2021).

STANDUP provides a set of interventions to boost treatment motivation in adolescents. In one of the first sessions, the therapist invites the teens to play a game of their own choice. The therapist watches, shows sincere interest, and engages with the adolescent by asking questions about why the teen is attracted by the game, and why gaming is a source of conflicts at home. Exploring this realm of the adolescent's life —inviting the problem behaviour into therapy at the get-go— gives insight into how the youth functions, how gaming fits into the teen's relational network, and if it acts to ward off stress or other mental suffering. Burning themes to look out for are reflected in statements like: "My parents are intrusive of how I manage my screens"; "My parents are ignorant (about gaming, the Internet in general), controlling and overanxious"; "My parents don't trust me", "The others at home have freer access to screens. This

is unfair." A therapist should expand on these themes and search for the underlying emotions and unmet needs (Bonnaire, Liddle, Har, & Phan, 2020; Bonnaire, Liddle, Har, Nielsen, & Phan, 2019).

In this game-playing and later sessions, the therapist also looks for instants of self-reflection by the teen. The adolescent may express feelings of hopelessness and loss of control (of gaming and other screen activities). Regularly, teens admit they feel sucked up by the gaming world. They may say that they game too much or cannot stop when they should, thus losing any notion of time.

The therapist shows genuine interest in what the adolescents are telling. Consequently, the teens feel being taken seriously and start seeing the therapist as a possible ally. They begin to realize that the therapist can help them to convince their parents that the teen's urge for gaming is not as destructive as they appear to believe. The teen's treatment motivation is thus increased (Nielsen et al., 2023).

Allowing the adolescent to play games during sessions is a treatment innovation. It would be unheard of, for obvious legal, medical, and ethical reasons, to allow substance abusing youth to produce their problem behaviour in a session. In PG, though, this is possible and we believe recommendable. Seeing the teens playing the game and hearing about their world, wishes and ambitions, helps the therapist to assess the case and draft a treatment plan.

6.2 Parents

The way the therapist approaches parents differs from that followed for teens (Bonnaire et al., 2019). At the beginning of therapy, parents feel tired, powerless, and desperate. Many have given up, collapsed to teen pressure, or have harshened their stance, adopting authoritarian measures in attempts to control their teen's gaming behaviour. The therapist should closely assess how the parents feel. Do they have the energy left to really commit to therapy or does the therapist first have to tend to their exhaustion? The assessment should be extended to personal problems of the parents (e.g., mental health, substance use) and to parenting style, the collaboration between the parents (teamwork or not?), the style of communication within the family, and family rituals (Table 1). Further, the therapist needs to know which home rules and other so-called mediation interventions the parents try to apply to control their teen's gaming behaviour.

In the initial assessment, it is also important to learn about the parents' personal screen use. The therapist asks questions but also observes: Do the parents play on their smartphone in the waiting room? Do they answer calls during the therapy session? Do they switch off the phone as the session is starting? In family sessions, are they phubbing their child?

Finally, exploring parents' thoughts and feelings about the teen's online activities gives the therapist access to their beliefs and underlying emotions. For instance, parents often fear that their child may become reclusive, violent, addicted, or psychopathic. Such thoughts are likely to affect the parent-teen relationship.

For building an effective alliance between the therapist and the parents, the concept of 'parental hell' has been found helpful (Liddle, 2002). The therapist gives ample space to the parents to talk about their struggles and focuses on efforts, inner debates, qualms, and emotions. This comes as a welcome surprise to parents; they are grateful for meeting a therapist who is interested in them, as a person and as a parent, rather than someone primarily intending to criticise their parenting. The therapist's conduct ought to convey a sense of care, inclusion, empathy, which benefits the alliance with the parents.

In PG, major 'parental hell' issues include lack of sleep due to the teen's loud late-night gaming; struggles getting the teen out of bed and to school; incessant conflicts around the amount of time spent on screens; and sometimes violent quarrels at 'switch-off time'. Also, parents may feel helpless and powerless in seeing their child being "sucked into cyberspace". This leads to frustration and impetuous limit-setting or to giving up. Another source of worry among parents is 'contamination' of siblings, with other children in the family taking up poor gaming habits too.

Parents feel a sense of doom and failure. They have already tried to implement plenty of rules and regulations to no avail. Sometimes, a relentless back and forth between punishment (confiscating screens) and coaxing (buying more games) is where they are at when therapy begins. The parents are plagued by feelings of guilt and shame. The therapist should acknowledge these emotions with empathy and compassion, without lectures and advice, and without psycho-educational tips and motivational techniques. If the therapist settles for just being there, with the parents and their pain, a sense of deep understanding, connectedness and support may arise.

These very feelings of despair and desolation can be harnessed to enhance the motivation of parents to engage in therapy. Once the energy trapped in the shame and guilt is freed, a new flow of motivation surges up. The therapist may seize the opportunity to engage the parents as co-pilots in the therapeutic process by stressing actions the parents could undertake. The first one is contributing to reconnection. The therapist may ask: "How were things before the screens took over the life of your child?" The parents are encouraged to remember the child they loved, the child with whom they long to reconnect. Then, the therapist calls the parents to action to reclaim their child. Parents should be aware that they can be of help. "You are the medicine." "Kids the age of your child are too young to regulate their screen use by themselves. They can't do it without your help." The third set of actions is to re-instate effective parenting. "It's not because your approach (rules and regulations, for example) didn't work that everything failed. Let's give it another try." This entire process of motivating and committing the parents may take several sessions.

Often, parents step into the therapy before the adolescent does. They may tell the therapist that their child denies having problems, hates therapy, and may drop out of the therapy soon. Once the therapist has visited parental hell with the parents, has welcomed their feelings of shame and guilt and has gained their trust, the parents feel

more secure to face their child's reluctance to participate. They feel re-energized and ready to engage the adolescent in a less confrontational way, ready to bargain certain aspects of the deadlock. Typically, they are willing to make some concessions if they have confiscated the gaming equipment or limited access to the Internet. When this opening occurs, the teen is more likely to commit to treatment.

6.3 Family

The first family session may be heated. The family members bring their conflict into the session: "Our teen is cyberaddicted!" versus "My parents are overanxious and intrusive!" Although plunging into this emotional heat is distressing for some therapists, it is essential to be in the heart of the drama. This helps efforts to restore emotional bonds and improve the parents-teen relations. Experiencing change is more effective than explaining change.

In this and later family sessions, the therapist follows up on the motivational work done in the first few sessions with the teen alone and the parents alone. The therapist encourages the family to start a (more) productive dialogue simultaneously at a practical level (rules for screen use) and a deeper level: emotions, family dynamics. The therapist constantly strives to create in-session experiences of proximity, mutual understanding, empathy, and commitment, stressing the need for collaboration.

As mentioned, the therapist uses in-session gaming by the adolescent to boost the teens' motivation to enter treatment. Later, when treatment alliances have been built and therapy is progressing, the therapist plans a family session involving game demonstration. This session is held after a few sessions with the youth alone and with the parents alone, preparing them for the in-session gaming demonstration (Nielsen et al., 2023).

In the family session, the teen plays a game that is likely to draw a response from the parents. During or after the gaming parents may voice their worries and concerns, may start discussions, and —guided by the therapist— may ask their children about their gaming world, the pleasures and challenges of gaming, about dreams and ambitions. Sometimes, the parents become emotional, horrified by what they see on the screen (e.g., violent, gruesome, or sexually explicit scenes), and may even leave the room. A game demonstration session also touches the teens. They may start to see their parents' concerns and worries in a different light and become more receptive to their parents' feelings.

In our experience, the in-session gaming intervention draws out the underlying tensions between the teen and the parents more clearly than mere discussion would do. In addition, game demonstration aids the parents to better understand the cognitive, emotional, relational, and behavioural drives behind their child's gaming. All this provides the therapist with valuable insights to foster the enactment exercises needed to improve communication between the family members (Bonnaire et al., 2020).

7. CONTINUATION OF THE THERAPY. WORKING WITH THE FAMILY MEMBERS TO ACHIEVE HEALTHIER GAMING

7.1 Creating early successes

When moving towards the middle part of the therapy, opportunities may arise to book, step by step, initial treatment successes. The therapist should grab these opportunities, thus boosting the motivation of the family members to complete the therapy (Liddle, 2002). For example, if there is an opening to engage the parents and the teen to an agreed set of rules and limitations regarding gaming, the therapist should accept the challenge.

Important in the search for early success is to take account of teens' complaints about the parents ("They don't trust me."). Therapist to youth: "If you really do your part, I will make this visible and known to your parents. You can count on me to tell them that you are trustworthy." The therapist makes sure that the teens are really committed to adhering to the new rules.

Engaging parents into conceding more access to games can be tricky early or midway in therapy. They need to feel that this is worth a try. They need to trust the therapist and accept the notion they can be co-pilots in the treatment, helpers of the therapist. If these conditions are not met, the therapist will fail.

Typically, the teen will ask for more screen time and/or less control by the parents (Nielsen et al., 2023). Usually, parents have been at this point before and have failed to come to workable agreements. They perceive this failure as having lost their authority and they are afraid of being disappointed again. What may convince them to give it a new try is the just mentioned commitment by the teen. With this commitment secured, the therapist reframes the parents' acceptance of the new rules as quite the opposite of failure or loss of authority. For parents, agreeing to the new rules is an act of trust and engagement, which takes deep love.

In STANDUP, the family is seen as a 'system', and the parents and the child(ren) as sub-systems, each with their own dynamics. System and sub-systems are denoted as (interactive) 'domains' (Liddle, 2002). Interventions in any of these domains can contribute to remedying adolescent problem behaviour. Accordingly, there are various paths towards tackling problem behaviour of youth. Clinicians should not let themselves be stuck when one domain is resistant to change. Rather, they may decide to choose another track and focus on other domains and targets in the search for treatment success.

7.2 Adolescents

The therapist works with the teens to foster and deepen self-reflection —vis-à-vis self and others. The self-focused reflection, an internal narrative, is about how they see themselves, which hopes, dreams, and worries they have, and which emotions are lurking inside (Liddle, 2002). They need this narrative to understand how they connect to oneself and to others, which events trigger stress, and how their gaming behaviour relates to all these emotions, relations, and stressors. To help the teen address these

internal issues, the STANDUP therapist explores links between PG and shortcomings in current life: schooling, family and friends, hygiene. This creates contrasts between things as they are now and hopes and dreams for future self.

As for the external narrative —directed at others—, the therapist encourages the adolescent to "show and tell their online story" to their parents: what they do online, with whom, what is so captivating about it, how it impacts them, and why it has come to take such a certain place in their life. The therapist also coaches the teens to talk with their parents about the emotional atmosphere at home. As a learning tool, role-playing with the therapist can be useful and fun. One theme could be coaching the adolescents to tell their parents what they could change to make the teens leave their room and spend more time with the other family members.

This approach with the youth is one of deepening introspection and self-comprehension. It involves an intimate conversation between the therapist and the youth, on par, sorting out the intricate complications of navigating different worlds: the outside one, the virtual one, the internal one, without losing oneself in the process. The goal is to reduce discrepancies between self and others and to construct a more coherent sense of self.

7.3 Parents and Family

Quite a few parents enter therapy complaining that their child has shut down on them and refuses to communicate with them. "If only my child would talk to me again and tell me what's going on instead of being glued to the games!", is a common lament. When in early family sessions the uncollaborative conduct of the adolescent is confirmed by reluctant behaviour and monosyllabic answers, the therapist works individually with the teen to coax out words and sentences as described above. Often, these words are harsh, reproaching and criticizing the parents. The therapist then prepares the adolescent to "tell their story" to the parents in a next family session. Separately, the therapist prepares the parents for what the teen is going to say. Parents need to learn how to hear. Not just listen but respond to their child in a manner that the teen feels being heard. Training to really hear is difficult. The therapist must be firm, interrupting the parents, for instance, when they are acting defensively. The parents tolerate this firmness thanks to the solid alliance established between them and the therapist. A strong alliance allows for robust interventions.

In the family session at issue, the teens muster up the courage to confront the parents. Prompted by the therapist, they talk about their pain and frustration, about perceived injustice, and about hating being controlled. If the parents are well-prepared for this session, they will not react defensively, will not justify their actions and attitudes, and will not hit back with responses such as: "Why should we be doing this when you are doing that?". If the talk between the teen and the parents would derail in mudslinging, all the efforts of the therapist on behalf of the teen will be in vain. The youth will shut down again.

Conversely, if the therapist has taken proper precautions, preparing both the teens and the parents for the family session, the adolescents start feeling that the parents are genuinely interested in what they have to say. The parents make clear they want to understand their child. They show sadness and compassion about their child's plight. The teen will open up, realizing that communicating with the parents may actually have positive effects in the end.

In the remainder of the therapy, the parents are in a central position, collaborating with the therapist to help their child. They realize that not only the teen but also, they, the parents, should change. When the parents adjust their ways and beliefs, they become better champions of motivating the teen to change.

8. PARENTAL MEDIATION TECHNIQUES

Questions about how parents can intervene in their teen's screen use are high on their list of priorities as they enter therapy. These screen use interventions are known as Parental Mediation Techniques (PMT). Much has been written about PMT, and guidebooks, pamphlets and websites for parents abound in advice and tips. In a systematic review of the literature (Nielsen et al., 2019), we identified four types of PMT. First, active mediation: The parents take time to discuss with their child the pros and cons of screen use. Second, restrictive mediation, which refers to parents' efforts to limit the access of teens to screens or to specific websites. Restrictive mediation includes screen-related rules and regulations (imposed or negotiated), parental control apps installed on the child's appliances, and confiscation of screens and gaming paraphernalia. Third, laissez-faire or no mediation: The parents do not intervene in their child's screen use, leaving it up to the teens to figure out how to cope with their devices and their urge to playing games. Finally, co-gaming: the parents are playing video games along with their teens.

Our findings were not in line with the expectations of many parents and clinicians. The systematic review showed that, in general, PMT was not particularly effective in mitigating teen PG. Across all publications screened, active mediation and co-gaming were without effect. Refraining from mediation (laissez-faire) was deleterious, i.e., raising the odds that PG would develop. The results for restrictive mediation were mixed, with some studies suggesting that this kind of intervention might be efficacious, whereas others failed to find any effect or showed restriction to be counterproductive, enhancing the risk of PG.

This is not to say that PMT is of no use. Further analysis of our dataset pointed out that parental and family factors interact with PMT interventions. Both positive parenting and positive family dynamics, as defined above, were associated with stronger positive effects of PMT, whereas negative parenting and negative family dynamics correlated with poor outcomes of PMT (Nielsen et al., 2019). Therefore, we recommend that PG therapy should start with interventions to motivate the youth and the parents to change their

attitudes and behaviour, to strengthen parenting, to improve communication among family members, and to restore healthy relationships between teens and parents. Early introduction of PMT is bound to fail if the family is dysfunctional. The therapist may place PMT on the agenda mid-way therapy, probingly at first, and more purposefully later when the family is united in its striving for change.

9. THE EFFICACY OF MDFT IN TREATING ADOLESCENTS WITH GAMING PROBLEMS

9.1 Study design

Our clinical experience with PG-adapted MDFT (STANDUP) was promising. We designed a randomized controlled trial to evaluate if it is indeed able to redress PG. The study site was an addiction treatment centre in Geneva. Study participants were adolescents (12 through 19 years old) with established problematic gaming, defined as meeting at least 5 out of the 9 DSM-5 criteria for Internet Gaming Disorder. Their mean age was 14.8 years. All but one were boys. In almost half of all cases, the parents had split up. Almost all teens were in school (Nielsen et al., 2021). The adolescents in this trial rarely drank alcohol or used drugs and with few exceptions had never been arrested by the police. In contrast, more than half of the adolescents with cannabis use disorder seen in the same treatment centre by the same therapists had alcohol use disorder and/or a history of committing criminal offences (Rigter et al., 2013).

The adolescents and their parents were blindly and randomly assigned by a computer to STANDUP (focusing on both intrapersonal and PF factors) or to Family Therapy as usual in the Geneva region in Switzerland (FTAU, focusing mainly on family factors). Both treatments lasted six months. Data were gathered, independently from teens and parents, on time spent on gaming, PG symptoms, mental health symptoms, quality of life, and school performance. This was done in three assessments: at baseline (before the start of the treatment), and at 6 months and 12 months follow-up (Nielsen et al., 2021). For rating quality of life, the valid Abbreviated Self Completion Teen-Addiction Severity Index (Reckers-Droog et al., 2020) was used, targeting topics/life domains including gaming, family, and school. On a 5-point scale, the adolescents rated the degree in which they experienced problems in the domain concerned, with scores varying from 0 (*no problems*) to 4 (*very big problems*). The parents used the same scale to rate the severity of their child's problems from their perspective.

9.2 Outcomes

9.2.1 *Study and Treatment Completion*

None of the participants dropped out of the study. All the STANDUP families completed the treatment as planned. Of the FTAU families, 30% dropped out of treatment, mostly because of dissatisfaction with the therapy or therapist. Most adolescents and

parents were "delighted" or "satisfied" with the treatment received, especially in case of STANDUP (Nielsen, 2021).

9.2.2 *Effect on Gaming*

Both treatments reduced PG (Nielsen et al., 2021). Between baseline and 6 months, the number of Internet Gaming Disorder criteria met by the adolescents decreased with 83% in the STANDUP and with 60% in the comparison group. The drop remained intact between 6 and 12 months. STANDUP outperformed FTAU on this measure; the effect was strong. All adolescents had PG at baseline. At 6 and 12 months, none of the STANDUP teens met the Internet Gaming Disorder diagnosis criteria any longer. FTAU also had a positive effect on this measure, with limited relapse seen at follow-up.

The teens in both groups played games on average for 3.6 hours a day. One year later, at 12 months, time spent on gaming had not changed despite the fall in PG prevalence rates.

9.2.3 *Quality of Life*

The teens in both treatment groups —all with established PG— were not worried about their gaming behaviour. At baseline, their mean score on the quality-of-life scale for the gaming domain was close to 1, which stands for "a few problems". This score dropped in both treatment groups to even lower values at follow-up assessments (Nielsen et al., 2021).

At baseline, the parents differed in opinion as to their teens' gaming problems, which they rated as "big". During and after treatment, however, the parents came around and their ratings of their child's gaming problems grew milder. The gap between the scores by the teens and those by the parents narrowed down. This change was seen in both treatment groups. Like the adolescents, the parents felt at follow-up assessments that their child's quality of life in relation to gaming had improved. Of note, not only the opinion of the parents softened, also their eagerness to impose restrictive rules on their child's gaming behaviour declined (Nielsen, 2021).

On another measure —self-reported symptoms of internalizing and externalizing mental disorders— we saw the same pattern of results: teens reporting fewer problems than their parents, but with parents scoring milder and more in line with the teens at follow-up assessments. In the STANDUP group, both adolescents and parents reported that the teen's mental health had gotten better across the study. Signs of improvement were less clear in FTAU.

Both treatments improved quality of life for other domains as well (family, school, overall quality of life) (Nielsen, 2021).

9.2.4 *School*

From school records, we abstracted data on grades obtained at school and on school absenteeism because of illness, truancy or suspension. In both treatment groups, school performance improved from baseline to 12 months follow-up (higher grades, less suspension) (Nielsen, 2021).

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 Insights from the Randomized Controlled Trial

The study just described confirmed that family therapy can mitigate PG in youth and improve mental health, quality of life, and school performance. On some measures, STANDUP outperformed FTAU, the comparison treatment, but on other measures both treatments performed equally well. Our trial was small. It needs to be replicated, with more power to establish differences between STANDUP and other types of therapy.

Despite remission of PG, the adolescents in our trial did not cut down on time spent on gaming. Possibly, they had learned to game in a less harmful way without having to scale back gaming time. Relevant, too, is the finding that the parents' worries about their child's gaming behaviour had waned. The parents thought their child's behaviour had become healthier. This may have weakened their inclination to keep the teen away from games.

A remarkable finding was the discrepancy in problem severity judgement between the teens and the parents. If not resolved, such discrepancy prevents treatments from being successful. Family therapy offers ways of bringing youth and parents closer together, which is needed for treatments to help young people overcome PG.

10.2 Recommendations for Therapists

From the work described recommendations for therapists can be derived:

- Therapists should not simplify a teen's problematic gaming by reducing it to an intrapersonal disorder. PG is multidimensional by nature (Nielsen & Kardefelt-Winther, 2018). Intra- and interpersonal risk and protective factors interact, so do distal and proximal factors. The interpersonal factors include characteristics of the parents, the family, and the social world of the adolescent outside the family.
- Accordingly, therapists should not focus their intervention on just the teen. We recommend involving the parents in the therapy. This can be done best within the framework of a family therapy.
- A therapeutic innovation is to invite the adolescent to play a game for the therapist to watch, and later again in the presence of the parents. Such game demonstration serves various purposes, including enhancing the adolescent's treatment motivation, assessing family communication and relationships, and creating in-session opportunities to target deficient family interactions directly. This intervention can evoke therapeutically relevant emotions and transactions among the family members.
- Clinicians need to remember that games are fun! They may be rewarding, and they may promote socializing and strengthen decision-making faculties. For many PG teens, games are a way to connect with others. While playing, they feel accepted, powerful, masters of their destiny, heroes in their epic games. All this may boost self-esteem and promote identity development. Ignoring the positive aspects of gaming is likely to weaken the therapist-adolescent treatment alliance.

- At the same time, gaming can become hell. Especially for significant others, in particular parents. Therapists should acknowledge the 'parental hell.'
- At the outset of therapy, parents will inevitably want to discuss home rules or other parental mediation techniques (PMT). This is fine if therapists keep in mind —and help the parents see— that for PMTs to become really effective, family communication and relationships need to be restored first. So, the aim of trying out a new PMT during the therapy should be as much about closing relational gaps between the parents and the teen as about mitigating PG.
- The outcome of treatment depends on the capacity of therapists to develop multiple alliances in a polarized family. Therapists should be comfortable with working in a family setting and at the heart of emotional tensions.
- Finally, there is no single magic therapeutic bullet for PG. We recommend that therapists address all areas of intrapersonal and interpersonal functional impairment in a multi-pronged approach to increase the chances of therapeutic success.

10.3 Recommendations for Parents

- Fostering a warm and respectful relationship with the teen is the best thing parents can do to protect their child from developing or continuing PG.
- Many guidelines for parents focus on parental mediation techniques (mostly active and restrictive mediation). This in itself is not wrong. However, parents should realize that restoring communication and the relationships with the teen matters at least as much as setting rules for using screens. PMTs work best once family functioning has been restored.
- As for type of PMT, parents should be involved and connected with the teen in a positive and firm way as regards screen use. Turning a blind eye or adopting a laissez-faire attitude is harmful. Harsh attitudes and severe punishment damage the relationships between parent and teen and may therefore be counterproductive. If the teen is unresponsive to the parents' rules and regulations, there may be something wrong on the emotional-relational level and not on the norm-setting level.
- To help their child, parents should work as a team. They need to back up each other. Teens will circumvent rules if parents disagree about the best approach.
- Parents are role models for their children. Thus, they should critically examine their own screen use. They should not exempt themselves from following rules because they are adults.
- PG can be a very real and awful reality, tearing families apart and harming the prospects of the teen concerned. In this case, parents should not hesitate to seek professional help, such as family therapy attuned to the PG target group.

11. IMPLEMENTING A TREATMENT PROGRAMME FOR ADOLESCENTS WITH GAMING PROBLEMS

Therapists wishing to apply family therapy for treating PG adolescents need to be experienced in working with families and family conflict. They should be trained and certified in delivering an evidence-based family therapy. In addition, they need further training, and certification, in using PG-adapted family therapy in clinical practice.

A treatment centre wishing to offer treatment for PG may wonder if there are briefer, cheaper treatment alternatives for family therapy. For instance, cognitive-behavioural therapy, which focuses on just the youth and requires fewer sessions. Possibly, the latter treatment model is feasible for mild cases of PG. However, we are convinced that a treatment centre cannot do without (also) offering family therapy as part of its array of PG therapy options. In our experience, treating teens involved in problematic gaming is challenging —often more so than treating substance abusing youth—, even when using the rich clinical toolbox of MDFT. It is hard to picture how all these teens can be adequately helped with briefer treatments of more limited scope.

It would be worth trying to set up a stepped-care programme for PG, based on triage at intake. In this approach, which needs to be evaluated, an experienced clinician would refer new PG clients to the brief programme or to family therapy.

Our work has been rooted in MDFT. Conceivably, other (adapted) family therapy programmes may be useful in PG. Such programmes should meet the condition that they include sessions with the adolescent alone and with the parents alone, and in addition sessions with the teen and the parents together.

We have developed a STANDUP training programme to acquaint family therapists with the complexities of helping PG adolescents and their families. We hope to extend access to this programme in upcoming years.

REFERENCES

APA. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*: American Psychiatric Pub.

Bonnaire, C., Liddle, H., Har, A., & Phan, O. (2020). Searching for change mechanisms in emotion-focused work with adolescents and parents: An example from multidimensional family therapy. *Couple and Family Psychology: Research and Practice, 9*(2), 100-121. doi:10.1037/cfp0000136

Bonnaire, C., Liddle, H. A., Har, A., Nielsen, P., & Phan, O. (2019). Why and how to include parents in the treatment of adolescents presenting Internet gaming disorder? *Journal of Behavioral Addictions, 8*(2), 201-212. doi:10.1556/2006.8.2019.27

Castro-Calvo, J., King, D. L., Stein, D. J., Brand, M., Carmi, L., Chamberlain, S. R., . . . Billieux, J. (2021). Expert appraisal of criteria for assessing gaming disorder: An international Delphi study. *Addiction, n/a*(n/a). doi:10.1111/add.15411

Domoff, S. E., Borgen, A. L., & Radesky, J. S. (2020). Interactional theory of childhood problematic media use. *Human Behavior and Emerging Technologies, 2*(4), 343-353. doi:10.1002/hbe2.217

Esteban, J., Suarez-Relinque, C., & Jimenez, T. I. (2023). Effects of family therapy for substance abuse: A systematic review of recent research. *Family Process, 62*(1), 49-73. doi:10.1111/famp.12841

Gao, Y., Wang, J., & Dong, G. (2022). The prevalence and possible risk factors of internet gaming disorder among adolescents and young adults: Systematic reviews and meta-analyses. *Journal of Psychiatric Research, 154*, 35-43. doi:-doi.org/10.1016/j.jpsychires.2022.06.049

Granic, I., Lobel, A., & Engels, R. C. M. E. (2014). The benefits of playing video games. *American Psychologist, 69*(1), 66–78. doi.org/10.1037/a0034857

Granic, I., Morita, H., & Scholten, H. (2020). Beyond screen time: Identity development in the digital age. *Psychological Inquiry, 31*(3), 195-223. doi:10.1080/1047840X.2020.1820214

Liddle, H. A. (2002). Multidimensional family therapy for adolescent cannabis users. *Cannabis Youth Treatment (CYT) Series, Volume 5D. HHS Pub. No. 02–3660 Rockville, MD: Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services Administration. Download available at http://www.mdft.org/mdft/media/files/Publications/MDFT-(2002)-CYT_Manual.pdf*.

Liddle, H. A., & Rigter, H. (2013). How developmental research and contextual theory drive clinical work with adolescents with addiction. *Harvard Review of Psychiatry, 21*(4), 200-204. doi:10.1097/HRP.0b013e31829aaa6b

Mannikko, N., Ruotsalainen, H., Miettunen, J., Pontes, H. M., & Kaariainen, M. (2020). Problematic gaming behaviour and health-related outcomes: A systematic review and meta-analysis. *Journal of Health Psychology, 25*(1), 67-81. doi:10.1177/1359105317740414

Nielsen, P. (2021). *Problematic gaming in adolescents: Identifying parent and family factors relevant for treatment*. University of Geneva,

Nielsen, P., Christensen, M., Henderson, C., Liddle, H. A., Croquette-Krokar, M., Favez, N., & Rigter, H. (2021). Multidimensional family therapy reduces problematic gaming in adolescents: A randomised controlled trial. *Journal of Behavioral Addictions*. doi:10.1556/2006.2021.00022

Nielsen, P., Favez, N., Liddle, H., & Rigter, H. (2019). Linking parental mediation practices to adolescents' problematic online screen use: A systematic literature review. *Journal of Behavioral Addictions, 8*(4), 649-663. doi:10.1556/2006.8.2019.61

Nielsen, P., Favez, N., & Rigter, H. (2020). Parental and family factors associated with problematic gaming and problematic Internet use in adolescents: A systematic literature review. *Current Addiction Reports, 7*(3), 365-386. doi:10.1007/s40429-020-00320-0

Nielsen, P., Rigter, H., Weber, N., Favez, N., & Liddle, H. (2023). In-session gaming as a tool in treating adolescent problematic gaming. *Family Process, 62*(1), 108-123. doi:doi.org/10.1111/famp.12846

Nielsen, P., & Rigter, H. (2026). Resolving normality–disorder boundary issues in gaming research: Commentary to the debate "Blurring the lines: Navigating the normality–disorder boundary in video game playing". Journal of Behavioral Addictions https://doi.org/10.1556/2006.2025.00463

Nielsen, R. K. L., & Kardefelt-Winther, D. (2018). Helping parents make sense of video game addiction. In *Video Game Influences on Aggression, Cognition, and Attention* (pp. 59-69): Springer.

Paulus, F. W., Ohmann, S., Von Gontard, A., & Popow, C. (2018). Internet gaming disorder in children and adolescents: A systematic review. *Developmental Medicine & Child Neurology, 60*(7), 645-659. doi:10.1111/dmcn.13754

Pine, A. E., Baumann, M. G., Modugno, G., & Compas, B. E. (2024). Parental Involvement in Adolescent Psychological Interventions: A Meta-analysis. *Clinical Child and Family Psychology Review*, 1-20. doi:10.1007/s10567-024-00481-8

Przybylski, A. K., Rigby, C. S., & Ryan, R. M. (2010). A motivational model of video game engagement. *Review of General Psychology, 14*(2), 154–166. doi.org/10.1037/a0019440

Reckers-Droog, V., Goorden, M., Kaminer, Y., van Domburgh, L., Brouwer, W., & Hakkaart-van Roijen, L. (2020). Presentation and validation of the abbreviated self completion teen-addiction severity index (ASC T-ASI): A preference-based measure for use in health-economic evaluations. *PLoS ONE, 15*(9), e0238858.

Richard, J., Temcheff, C. E., & Derevensky, J. L. (2020). Gaming disorder across the lifespan: A scoping review of longitudinal studies. *Current Addiction Reports, 7*(4), 561-587. doi:10.1007/s40429-020-00339-3

Rigter, H., Henderson, C. E., Pelc, I., Tossmann, P., Phan, O., Hendriks, V., . . . Rowe, C. L. (2013). Multidimensional family therapy lowers the rate of cannabis dependence in adolescents: A randomised controlled trial in Western European outpatient settings. *Drug and Alcohol Dependence, 130*(1-3), 85-93. doi:10.1016/j.drugalcdep.2012.10.013

Schaub, M. P., Henderson, C. E., Pelc, I., Tossmann, P., Phan, O., Hendriks, V., . . . Rigter, H. (2014). Multidimensional family therapy decreases the rate of externalising behavioural disorder symptoms in cannabis abusing adolescents: Outcomes of the INCANT trial. *BMC Psychiatry, 14*(1), 26. doi:10.1186/1471-244X-14-26

Seidel, D. H., Markes, M., Grouven, U., Messow, C. M., Sieben, W., Knelangen, M., . . . von Pluto Prondzinski, M. (2024). Systemic therapy in children and adolescents with mental disorders: a systematic review and meta-analysis. *BMC Psychiatry, 24*(1), 125. doi:10.1186/s12888-024-05556-y

Stevens, M. W. R., King, D. L., Dorstyn, D., & Delfabbro, P. H. (2019). Cognitive-behavioral therapy for Internet gaming disorder: A systematic review and meta-analysis. *Clinical Psychology & Psychotherapy, 26*(2), 191-203. doi:10.1002/cpp.2341

World Health Organization (2019). *International Statistical Classification of Diseases and Related Health Problems* (11th ed.). https://icd.who.int/]

Zajac, K., Ginley, M. K., Kelly, L., Flori, J., & Pfund, R. (2024). Tackling internet gaming disorder: what are the challenges in its treatment? In (pp. 1-3): Taylor & Francis.

Zhuang, X., Zhang, Y., Tang, X., Ng, T. K., Lin, J., & Yang, X. (2023). Longitudinal modifiable risk and protective factors of internet gaming disorder: A systematic review and meta-analysis. *Journal of Behavioral Addictions, 12*(2), 375-392. doi:10.1556/2006.2023.00017

CASE REPORT: LOLA AND HER FATHER

When 12-year-old Lola first stepped into the office, she sat down between her parents. Her divorced mother and father rapidly described their core concern: their adopted child was destroying herself, her future, and her family through uncontrolled and unlimited playing of Internet games. Lola, according to her mother Farah, was addicted to *Blablaland*, a now-defunct online chat-game. She had, in her mother's words, "all the traits of a heroin addict" and, if not stopped, would "end up in the gutter." For father Mammad, the main concern was his daughter's difficulties in relationships. He portrayed her as a "primitive animal, like a monkey" in terms of social skills and behaviours. She was rarely invited to a friend's house. Although intelligent, her grades were dropping, and she was showing signs of disrespect towards some of her teachers. Farah, a lawyer, and Mammad, a businessperson, lived within walking distance of each other and Lola spent equal weekly time at both homes. The precipitating event leading to therapy was a violent incident at Farah's home. On a recent evening, she had once again accused Lola of taking her credit card to buy gaming paraphernalia. Farah said that Lola had "snapped and become a monster" and that she had slapped her in the face and pushed her in the chest. Scared and shocked, Farah had locked herself up in the bathroom and called her ex-husband to the rescue. Mammad had immediately come over to calm the situation. Both parents agreed this episode had been one too many: they were losing their child who was being "sucked up into virtual reality".

Turning to Lola for the first time, the therapist (author PN) asked her if this was how things happened according to her, and whether this was why we should all be meeting up and talking together. "Not really", she answered. She continued with her own take on her gaming behaviour. "If they just would trust me and let me play more, I could show them that I am not addicted and that I can manage my time. Right now, since they are always hovering over me, I just grab as much playing time as possible. They want me to connect with friends, but they don't realize that that is exactly what I am doing online. I have so many friends on *Blablaland*, they couldn't imagine. They treat me like a five-year-old and not like a twelve-year-old. Also, when I go to the bathroom at 2 a.m., I see my dad on his computer. So, why not me? And my mom? Well, she loves our dog more than she loves me. She says our previous dog committed suicide because of me —by 'jumping off the balcony'. That's not true. I love dogs."

During the session it became clear that the challenges faced at the father's home differed from those faced at the mother's home. This case report will focus on three-step protocol interventions targeting the father-daughter relationship. Similar interventions were undertaken in the mother-daughter relationship.

Step One: With the Father Alone

The therapeutic alliance with the father was strong from the outset, partly because Mammad was very appreciative of the trusting relationship the therapist had established

with his daughter. Thus, in the Step One session with the father, PN was able to directly address the second goal: identifying areas of fear, distress, and concern surrounding the gaming activities which affected communication and connection. Mammad's 'parental hell' comprised many concerns. Lola would play until late at night and this frayed her nerves but also his. He was not aware of which specific games she was on, and this alarmed him. She would be unresponsive when he tried to intervene. This made him think back to times when he had witnessed Farah trying to intervene in the same way. Feeling ignored as a parent led to rage. Yes, he also could become a monster. Mammad said he loved his daughter but felt disgust and rejection when she disengaged or flew into a rage. This triggered great anxiety in him. Would she perceive this, doubt his love, and feel rejected by him? Would she tell her mother who had accused Mammad of domestic violence? This state of turmoil, he recognized, was affecting Lola.

When PN emphatically mirrored back the tremendous burden of Mammad's struggle as he was simultaneously trying to cope with Lola and himself, with the past and the present, Mammad let out a sigh and relaxed in his chair. This seemed to signal the possibility of moving on to the third goal: seeking ways to deal with the gaming situation which would promote higher connectedness between his daughter and him.

Mammad did not really know the content of Lola's gaming. Although the first part of the session had drained him emotionally, he perked up and felt enthusiastic about the idea of her presenting her favourite games. He expressed genuine curiosity and eagerness to try this experiment. "Why hadn't I thought of this before?"

PN was appreciative of this eagerness and open curiosity and proposed that Mammad "reactivate and reclaim" this internal place when visiting the games with his daughter in the upcoming session.

Step Two: With the Daughter Alone

The gaming session with Lola took place at her father's home, in her bedroom. Her room was tidy and PN and Lola sat together, shoulder-to-shoulder, at her worktable. She had a slow and aged computer but did not seem to mind. The session was framed as such, "I don't think your dad knows what's going on when you are gaming. I am wondering if it might not be important to share with him what you are up to. I suspect that he thinks you are just wasting time and getting yourself into bad business and becoming addicted to your computer. Could you walk me through your favourite game so that I can understand what happens for you, and why it is so important to you?"

Lola was thrilled at this proposal, and there was a relishing undertone to her enthusiasm, as though, through PN, she would be able to, at last, state her case to her parents. She logged in to her game and started playing, explaining the basic rules, the avatars, pointing out her acquaintances who were also playing and sending them brief messages. However, despite probing by the therapist, her comments remained scant and superficial, the gaming activities seemed repetitive and stereotyped, the interactions with the co-gamers few. For PN, this was in stark contrast to other gaming sessions he

had witnessed in other therapies. These were usually characterized by high emotional intensity, rapid multitasking, and deep commitment to team members. Here, it felt lonesome and boring.

When PN asked what Lola would like for her father to understand about the gaming, she stopped and thought. "I wish he would just accept this part of me so that I wouldn't have to play in my room alone", she eventually said.

PN: "You would rather play elsewhere?"

Lola: "Yes, in the living room, when Dad is there."

This last comment reminded PN of a fond memory which Mammad had shared in an initial family session. He longed for the days when Lola was younger, and they would spend time together drawing with crayons in the living room. She had grown into a teenager, and this was not age-appropriate anymore. Was she also missing these moments? Her answer to this question was nuanced. Yes, and no. According to her, both parents had not seen that she had grown. They were not giving her the chance to prove this. She wanted to be close to her dad but not too close. But also, she missed cuddling up to him.

PN: "What would it take from you and your dad to be able to play in the living room while he is there?"

Lola: "If he understood that this game is harmless, it would work."

PN: "So, how about if we show him your game next time?"

Lola (enthusiastically): "Yeah, that would be great!"

PN: "Would it also help prove your point if you could stop gaming without blowing up? Should we also mention this?"

Lola (less enthusiastically): "Probably."

Step Three: Daughter and Father

When PN arrived at their home, Mammad and Lola were already sitting in the living room with the computer on. Lola was impatient to start. Mammad seemed more reserved about the exercise, starting the session by wondering aloud if this agenda would not be a green light for Lola to play incessantly. Lola tensed up immediately. PN cut in, reminding all with insistence that, on the contrary, this, he hoped, was a way to reclaim the relationship and prompt Lola to become more responsive to limits and deadlines. Lola was tearing up in rage and disappointment. "You never let me show you!" she screamed in anger.

This sudden outburst of frustration and grief caught Mammad by surprise and enabled him to snap out of his fears. Jumping on this opportunity, PN coaxed Lola to say more about how this made her feel, how she felt misunderstood by her father and how she wished she could be accepted by him also in this realm.

Lola: "I just want to show you that there is nothing dangerous in what I am doing."

Mammad: "It's not the what, it's the how much!"

PN: "Mammad, remember our last conversation. I think Lola is aching for your approval. In fact, I think you both miss each other horribly. I recall what you said about

the drawing sessions you had together not so long ago. There is something down those lines which is aching to be retrieved."

Mammad: "You're right. (Sighing). You see, sweetheart, sometimes I say that you turn into a small monster when you get angry with me. Well, the same happens with me also."

Lola: "Yes (giggling). OK, now can I show you?"

The wave of outrage and fear behind them, Mammad let himself be guided through *Blablaland* by Lola, showing curiosity, and clumsily trying to join in the gaming. This provoked jokes and teasing on behalf of Lola. She was evidently happy.

PN: "How do you feel, Lola?"

Lola: "This is cool. I wish it could happen more often."

PN: "How about you, Mammad? Are you still worried about the time issues?"

Mammad: "I really loved this. I am so proud of you, Lola, and you must know that when I become a monster, it's that I am just a very worried father. And when you don't respond to me, it makes me snap. I don't want that to happen anymore. How can we do this differently?"

Lola: "..."

PN: "Lola, you mentioned to me that you would maybe feel better if you played in the living room, in the vicinity of your dad. Remember that? Do you think that could help you listen better and obey more?"

Lola: "I don't know."

Mammad: "That's a great idea! Lola, how about we try this. We will revisit the authorized times for playing and you can do that with me. I'd love it if you came into the living room, and we did some gaming together. Shall we give it a shot?"

Lola: "Sure."

Follow-up

This was one of several daughter-father sessions involving gaming. The relationship between Lola and her father became lighter and more carefree. At the end of therapy, Mammad told PN that he enjoyed her presence now and missed her when she was at Farah's place. The mother-daughter relationship remained problematic. In-session gaming was tried and failed to produce any significant détente. Lola remained highly ambivalent toward her mother, oscillating between "I love you" and insult. Farah continued to swing between overly harsh and overly lax attitudes. Four years later, the father visited PN to update him on his daughter's situation. The problematic gaming had ceased. Lola was into horse riding, and this had a soothing effect on her. Mammad and she were getting along well. This was not the case with the mother. Mother and daughter had physically fought again recently. Lola was now in a private school and was the best student of the class. Although she still was shy, her social awkwardness had receded, and Lola was developing friendships.

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MINDFULNESS-BASED INTERVENTIONS IN THE TREATMENT OF BEHAVIORAL ADDICTIONS

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ABSTRACT:

Mindfulness is defined as nonjudgmental, nonreactive, metacognitive attention focused on the experience of the present moment, without being caught up in thoughts about the past or future (Garland, 2007). Mindfulness-based interventions are gaining growing interest in the field of clinical psychology. This third-wave cognitive behavioral therapy (CBT) has been shown to be effective in the treatment of various psychological disorders such as depression, anxiety, and substance use and addictive disorders. Mindfulness-based interventions are not condition-centered but aim to modify, from a trans-diagnostic perspective, key psychological processes —such as experiential avoidance or rumination— involved in the etiology of various psychopathological disorders. In this regard, mindfulness-based approaches are particularly relevant in the case of comorbid disorders, which are the rule rather than the exception in patients presenting with addictive behaviors. Individuals with addictive behaviors frequently exhibit a tendency toward avoidant coping styles. These coping styles have notably been linked to the severity of substance use disorders and the experience of cravings. Unlike classic CBT, mindfulness-based therapies do not aim to modify thoughts or emotions, but to change one's relationship to them. Essentially, rather than adjusting or modifying thoughts or emotions to prevent the manifestation of a particular behavior with the aim of suppressing the mental activity, mindfulness entails stepping aside and observing mental activity without judgment, refraining from the automatic need to react. Attempts to suppress emotions and thoughts might paradoxically heighten their intrusion. Learning the skills of accepting and nonreactively dealing with internal discomfort has the potential to enhance the management of negative emotions, which seems to be a particularly efficient approach in the treatment of patients with addictive disorders. In this chapter, we give a presentation of evidence-based mindfulness interventions, their indications, and their postulated mechanisms of action. We outline the interest in these interventions more specifically in the treatment of behavioral addictions and their complementarity with classic CBT approaches. We provide a detailed description of the Mindfulness-Based Relapse Prevention (MBRP) program (Bowen et al., 2011), which was designed specifically for the treatment of substance use disorders but is also relevant in the context of behavioral addictions (von Hammerstein et al., 2018). Finally, we describe a detailed case of a patient with gambling disorder who was provided with MBRP.

KEYWORDS:

mindfulness, CBT, coping, craving, psychological processes, addictive behaviors, gambling

1. MINDFULNESS

Mindfulness is defined as nonjudgmental, nonreactive, metacognitive attention focused on the experience of the present moment, without being caught up in thoughts about the past or future (Garland et al., 2007). Humans are involved in thinking much of the time, and often our thoughts have nothing to do with what we are actually doing. When we walk down a street, we can easily think about things that have nothing to do with walking or even our immediate surroundings. Thoughts like "I shouldn't forget to send this e-mail to my coworker" or "the presentation I have to give tomorrow at work is going to be stressful" frequently occur. Of course, cognitions are essential to carry out actions successfully, but, in general, most people present with a tendency to think a bit too much, especially about things that have nothing to do with their current situation. When we get stuck in thoughts, they often relate to situations that cannot be changed at that moment, such as events from the past or future. Sometimes the thoughts that we experience can trigger emotions. Even if a thought is nothing more than an imaginary scenario, the emotions it can trigger are genuinely experienced.

Mindfulness is about being present in the moment, being aware of emerging thoughts, but not being caught up in them. The same applies to emotions. Being mindful does not imply getting rid of them or suppressing them, but being aware of their existence, without necessarily reacting to or judging them, but simply accepting their existence.

When we behave in an impulsive and non-premeditated way, it frequently aims to suppress an emotion that is felt as uncomfortable (Maier et al., 2021; Rogier et al., 2018). If someone punches a wall because they are feeling angry, their aim is to get rid of their anger. Unfortunately, this strategy is usually ineffective. In general, this sort of impulsive behavior perpetuates and even reinforces the negative emotion (Cyders & Smith, 2008; Eben et al., 2020). In such a case, they might review all the potential reasons that could explain their anger, as if this anger must be justified and understood. Research shows that, typically, the process of going through all the reasons that might

explain this negative emotional state is involved in perpetuating it rather than removing it (Campbell-Sills et al., 2006; Wegner, 2011). The same reasoning can be applied to sadness. When someone is feeling sad, they might similarly try to identify all the reasons that might explain it. This automatized tendency to list the various reasons for sadness is called rumination and is one of the main processes underlying depressive disorder (McLaughlin & Nolen-Hoeksema, 2011; Nolen-Hoeksema, 2000; Watkins, 2009). Even if ruminative processes in some way constitute an attempt to resolve the emotion, they generally tend to intensify it (Kennedy et al., 2022; Selby et al., 2008).

Individuals rarely feel overwhelmed by a positive emotion or have the impression of getting stuck in it. It could be hypothesized that when we experience positive emotions, we do not enter into a "problem-solving" mode, but rather welcome and accept the positive emotion, which is why they generally tend to disappear relatively quickly (Kober et al., 2019).

In the case of persistent emotional disorder or symptoms, the problem is thus not the experience of negative emotions, which ultimately constitutes a frequent and transient phenomenon, but rather the reaction that is displayed (often automatically) to suppress them (Campbell-Sills et al., 2006; Cribb et al., 2006; Hayes et al., 1996; Hayes & Hofmann, 2017; Newman & Llera, 2011). The aim of mindfulness practice is thus not to change the content of thoughts or the quality of experienced emotions, but to modify the relationship people have with them.

An aptitude for mindfulness can be conceived as a trait whose levels vary from one individual to another. Higher mindfulness levels are generally associated with healthy behaviors, such as physical activity, healthy eating, and sleep (Sala et al., 2020), and also with higher self-esteem, adaptive coping strategies, optimism, and life satisfaction (Brown & Ryan, 2003; Weinstein et al., 2009). On the other hand, a low mindfulness trait is associated with anxiety, depressive symptoms, perceived stress, automatic responses, and impulsivity (Brown & Ryan, 2003; Weinstein et al., 2009). Mindfulness levels have also been shown to be associated with more efficient executive functions, especially inhibitory control and well-being (MacAulay et al., 2022). Furthermore, mindfulness traits appear to play a protective role against psychological distress in patients with chronic pain (Miniati et al., 2023).

Trait mindfulness is negatively associated with problematic gaming (Chiorri et al., 2023) and negatively mediates the relationship between problematic gaming and negative affectivity, while positively mediating the relationship between problematic gaming and positive affectivity (Mettler et al., 2020). This finding may suggest that mindfulness could be a psychological resource and protective factor in the context of problematic gaming. Mindfulness-based interventions have been shown to be effective in reducing the number of symptoms in patients with problematic gaming or gaming disorder in comparison to that in a support group (Li et al., 2017).

Dispositional mindfulness has also been found to be related to less severe gambling outcomes (de Lisle et al., 2014; de Lisle et al., 2012). Mindfulness-based interventions

have shown interesting results in the treatment of gambling disorder, especially when gambling is associated with other mental health difficulties (von Hammerstein et al., 2018). A systematic review of the literature and a meta-analysis showed promising results of the effect of mindfulness-based interventions on gambling behavior and symptoms, urges, and financial outcomes (Maynard et al., 2018).

2. MINDFULNESS-BASED INTERVENTIONS

Mindfulness-based interventions aim to increase the level of mindfulness and thereby enable people to develop an additional psychological resource to deal with the emotional distress that they experience. Although originally derived from Buddhism, mindfulness is now widely practiced, and mindfulness-based interventions are free from any religious or spiritual reference. They belong to the third wave of cognitive behavioral therapy (CBTs), also called acceptance therapies (Hayes & Hofmann, 2017). Two specific types of mindfulness-based interventions, whose efficacy has been validated by several studies (Hofmann et al., 2010; Hölzel et al., 2011; Piet & Hougaard, 2011), are the Mindfulness-Based Stress Reduction program (Kabat-Zinn et al., 1991), which is particularly recommended for patients with anxiety disorders, and Mindfulness-Based Cognitive Therapy (Segal et al., 2002), which is particularly adapted to the treatment of depressive disorders. These interventions take place in groups over the course of eight sessions, with one session per week at 2 hours per session. Other therapies such as acceptance and commitment therapy (Hayes & Hofmann, 2017) or dialectical behavior therapy (Linehan et al., 2002), which generally take the form of one-on-one sessions, also comprise elements, principles, and techniques from mindfulness-based interventions.

3. MINDFULNESS IN THE TREATMENT OF BEHAVIORAL ADDICTIONS

CBT tends to be considered the gold-standard treatment for behavioral addictions such as gaming and gambling disorders (King et al., 2017; Pfund et al., 2023; Zajac et al., 2020). It is based on the principle that behavior is preceded by cognition. In the context of addictive behaviors, erroneous cognitions or irrational beliefs are postulated to lead to the addictive behavior. CBT aims to identify the cognitions involved in the onset and perpetuation of addictive behavior. The objective of CBT is to modify the problem behavior either by acting directly on the thought that triggers the behavior, with the goal of restructuring it by confronting it with reality, or by modifying the behavior (through exposure) and thus making the patient aware of the irrational nature of the thought that triggered the behavior.

Despite good results for CBT in the treatment of addictive behaviors, relapse rates remain very high, with 40-60% of patients relapsing within 12 months of starting treatment (McLellan et al., 2000). In the context of behavioral addictions, robust evidence is still lacking for relapse rates following CBT treatment, although it is likely that the picture is comparable to what happens in the context of substance use disorders. Research suggests that the effects of CBT might fade over time (Magill & Ray, 2009). In particular, some specific dysfunctional thoughts appear to be difficult to restructure, especially when the ensuing behavior is aimed at suppressing a negative emotional state. Suppression of a negative emotional state is central to most addictive behaviors, including behavioral addictions such as gaming and gambling disorders (Brand et al., 2019). Despite the negative consequences of the behavior in the long term, in the short term, it fulfils its role of suppressing the uncomfortable or unbearable emotion. In people with an addictive disorders, it is generally an automatic pattern that has taken hold for a long time.

Emotional suppression is a common characteristic of all addictive behaviors (Stellern et al., 2023; Velotti et al., 2021). Gaming disorder is associated with experiential avoidance (García-Oliva & Piqueras, 2016) and reduced awareness of and ability to accept emotions (Schettler et al., 2024). Gambling disorder has also been shown to be associated with emotional suppression and is negatively linked to mindfulness (Velotti et al., 2021). It seems particularly important to address these underlying processes, given that addictive disorders so commonly co-occur with other disorders (Ayala-Rojas et al., 2022; Nicholson et al., 2019).

Another important factor involved in the etiology of addictive behaviors (including gambling and gaming disorders; see, e.g., Brand et al., 2019) is impulsivity. A large body of scientific evidence shows that impulsivity is an important risk factor for the onset, perpetuation, and relapse of addictive behaviors (Verdejo-García et al., 2008). Impulsivity is a multidimensional construct. In particular, it comprises impulsivity of action, reflected in difficulty in inhibiting behavioral responses (Bates et al., 2013; Luijten et al., 2014; Noël et al., 2007; Wilcox et al., 2014) and impulsivity of choice, including the difficulty in delaying a reward and the preference for an immediate smaller reward over a delayed but larger reward (MacKillop et al., 2011). It is these difficulties with self-control that seem to be involved in relapse in problem gaming (Gong et al., 2022) and problem gambling (Grant et al., 2016; Leeman & Potenza, 2012; Mallorquí-Bagué et al., 2018). The ability to inhibit behavior plays a key role in the management of craving (Antons et al., 2020). Craving has been identified as a robust predictor of relapse (Schneekloth et al., 2012; Smith et al., 2013) and can be experienced as a negative or uncomfortable emotional state (even though the concept of craving is much more complex and its definition is the object of much debate), which is likely to promote the need to suppress it through the addictive behavior. The conjoint effect of low self-control and high impulsivity and its association with emotional suppression (Berghoff et al., 2012) might partly account for the limitations of traditional CBT in the treatment of addictions (Testa et al., 2022). In

other words, for some patients, the need for immediate relief and the inability to inhibit a behavior might make rational thought inaccessible, even though they learn to elaborate rational thoughts through CBT. This view aligns with a seminal model of gambling disorder that posits different pathways to this disorder (the Pathways Model of problem gambling, see Blaszczynski & Nower, 2002) and suggests that the CBT-alone approach might be sufficient to treat behaviorally conditioned gamblers but not necessarily those with emotional vulnerability or heighted impulsivity. This is the reason that, for some patients —typically those experiencing emotional dysregulation and marked impulsivity— the association of conventional CBT techniques with mindfulness techniques could be particularly relevant. As mindfulness is known to foster cognitive control (Tang, Posner, Rothbart, & Volkow, 2015) by modifying the perception of one's thoughts and emotions instead of their nature, it has the potential to increase tolerance to the thoughts and emotions that typically lead to loss of control over the behavior and make individuals aware that there is no need to react immediately to those cognitive manifestations that will ultimately vanish. Mindfulness-based interventions have been shown to be efficient in the treatment of substance use disorders and behavioral addictions and appear to be more effective in the long term than conventional CBT is (Bowen et al., 2014; Sancho et al., 2018; Tang, Posner, et al., 2015; von Hammerstein et al., 2018, 2019).

4. THE MINDFULNESS-BASED RELAPSE PREVENTION PROGRAM

Low levels of mindfulness are reportedly common in populations with substance use and addictive disorders (Dakwar et al., 2011; de Lisle et al., 2014). Accordingly, a mindfulness-based intervention designed specifically for patients with addictive disorders has been developed called the Mindfulness-Based Relapse Prevention (MBRP) program (Bowen et al., 2011). It incorporates mindfulness meditation exercises and features from Marlatt and Gordon's cognitive-behavioral program (Gordon & Marlatt, 1985), which enables patients to better identify at-risk situations and develop strategies to avoid relapse. This eight-session program directly targets adverse emotional states and their impact on relapse. This program was initially designed for the treatment of substance-related addictions, but as it targets craving in general and, more broadly, emotion regulation and the promotion of psychological resources, it can easily be applied to gambling and gaming disorder (see, e.g. Shirk et al., 2022, for an application in the context of gambling disorder). Through mindfulness practice, patients can better identify the sensations that arise, such as those involved in craving, and observe them without responding to them in an automatic or impulsive way. The aim is to take the time to observe the craving, to identify exactly what it consists of (physical sensations/thoughts/emotions), and to note its ephemeral nature. In this program, participants are exposed to uncomfortable sensations (such as craving) to enable them to increase their tolerance to such sensation and their capacity to "let it go." Unlike other forms of treatment, mindfulness-based

therapies lead the person to pay attention to the cognitive and emotional processes that potentially lead to compulsive behavior and relapse instead of avoiding them. The risk of relapse can be reduced if the patient is able to increase their attentional and cognitive skills. A mindfulness state is also associated with an increased capacity to recognize high-risk situations and dysfunctional beliefs or expectancies that can lead to relapse. A mindfulness state does not imply emotional avoidance, but promotes a state of being aware of emotional states and accepting them rather than trying to suppress them through compulsive or addictive involvement in behaviors such as gaming, gambling, and eating, to name just a few representative examples. It has been shown that mindfulness training can reduce conditioned behavioral responses through the individual paying attention to the conditioning itself (Bowen et al., 2011).

The MBRP program (Bowen et al., 2011) is delivered in a closed group format, typically with groups of 6 to 10 participants. The group is led by a trained MBRP instructor. It runs for 8 weeks, with one 2-hour session per week. A standard session includes the following elements: an update on meditation home practice, meditation exercises, feedback on these exercises, and a prescription of home tasks until the next session.

The eight sessions, along with the exercises used, are described in the next sections.

4.1 Automatic Thoughts and Relapse

This session consists of an introduction and definition of the concept of mindfulness. The program and home tasks are described. The exercises in the first session are the following:

- **The raisin meditation:** This is the first exercise in the program and consists of eating a raisin with full awareness. This exercise is a perfect illustration of how to do mindfully an activity that we have probably done hundreds of times, without paying attention to it, in an automatic way. This exercise helps to differentiate between doing an action mindfully and non-mindfully by introducing the notion of mindfulness but also contrasting it with notion of "automatic pilot." The exercise also provides an opportunity to discuss the link between automatic pilot and addiction.
- **The body scan:** This is probably one of the best-known and used mindfulness-based exercises. It consists of paying attention to each part of the body in succession, one after the other, and allows one to become fully aware of physical sensations. Awareness of physical sensations plays a pivotal role in the practice of mindfulness. Emotions are often accompanied by physical sensations, and paying attention to these sensations can make it easier to recognize and identify emotions and thus stop conditioned behavioral responses. Focusing on physical sensations can also be a way of bringing attention back to the present moment and stopping mind wandering, which is generally at the origin of the emergence of irrational thoughts.

4.2 Trigger Awareness and Craving

The second session starts by addressing the difficulties that participants may have experienced with their meditation practice, such as aversion, impatience, restlessness, doubt, or the desire to do well. It is particularly important to talk about these difficulties so that participants do not become discouraged. The main aim of this session is to identify the triggers and to experience them without reacting to them.

The exercises in the second session are the following:

- **Walking down the street:** This exercise consists of imagining a scenario in which the participant is walking down the street, comes across someone, and waves to them, but the person does not answer. The scenario is considered to be neutral, but ambiguous, and will give rise to thoughts, i.e. interpretations, as to why the person did not react ("She doesn't want to see me anymore; I've disappointed him too much"), and then emotions ("disappointment/sadness") and perhaps physical sensations ("weight on the chest or tension"), as well as a desire to react ("What's the point in making an effort, I've disappointed people too much, I might as well continue my problematic behavior"). This exercise shows that, given a neutral imaginary scenario, our mind naturally and automatically produces a series of thoughts, emotions, sensations, and urges to react. It also helps us to better identify and adjust our mental processes.
- **Surfing the urges:** This is the key exercise in the program. It consists of imagining a situation that triggers a craving. Generally, most interventions aim at the implementation of strategies to avoid the emergence of craving or to radically focus attention on something else when it does appear. Here, the aim of this exercise is to change the way people perceive and live, in other words, to stop seeing it as a threat to be avoided or suppressed at all costs and to explore it in a more nuanced way, welcoming it and "staying with it," and to make them aware that craving, like any other mental production, is ephemeral. In the end, craving is nothing more than a combination of physical sensations and thoughts that do not necessarily need to be suppressed immediately. Craving is often seen as something intrusive, overwhelming, or intolerable, which increases until the much-desired behavior has to be dealt with. However, responding to craving by using the drug that was craved or by behaving (in the case of non-substance-related addictions) only briefly relieves the discomfort it generates, as if we were trying to quench thirst by drinking salt water.
- **Mountain meditation:** The previous exercise can trigger challenging experiences for the participants. The mountain meditation consists of visualizing the image of a mountain, emphasizing its qualities: stability, strength, solidity, balance, constancy. Then it is a matter of becoming one with the image of the mountain and experiencing these qualities for oneself. It is about feeling strong, stable, and grounded.

4.3 Mindfulness in Daily Life

The third session introduces mindfulness practice into daily life. Session three includes the following exercises:

- **Sound awareness:** This exercise involves listening carefully to all sounds. The aim is to become aware once again that our mind automatically interprets what it perceives. Simply listening to sounds and their texture instead of trying to understand the sounds or identify were they come from is a difficult exercise, but one that can be practiced easily in any situation.
- **Breathing meditation:** This exercise consists of following the movements of the breath, without trying to change it. Focusing on breathing can be an effective way of staying in the present moment and not getting caught up in thoughts. The aim of mindfulness is not to stop thinking, but to notice that we have lost ourselves in a thought and to return to the exercise.
- **SOBER exercise:** SOBER is short for Stop, Observe, Breathe, Expand, Respond. The acronym provides easy self-guidance for the exercise. It is a very short exercise, lasting around 3 minutes, and the aim is to use it in high-risk situations, situations in which we might be led to react automatically, for example, by engaging in addictive behavior.

4.4 Mindfulness in High-Risk Situations

This session enables participants to identify and manage high-risk situations by using mindfulness. The exercises included in this session are as follows:

- **Awareness of sight:** This exercise is the same as the sound exercise but focuses on what the participants can see and not the sounds. Some patients may be sensitive to visual triggers. Here it is about observing the surroundings objectively and without judgement. This allows people to train themselves to avoid making interpretations and to avoid developing the emotions that go with these interpretations.
- **Staying with discomfort:** This exercise is a longer sitting meditation based mainly on sensations and breathing, during which the participant is asked not to change their initial position. After a while, discomfort may naturally appear, a stiff leg, itching, restlessness, and all the cognitions that will amplify this discomfort, such as "This is unbearable, I can't take it anymore." The aim is to get the participant to adopt the perspective of a mindful and curious explorer with regard to this discomfort in order to observe how it evolves and, if appropriate, to notice that it is not permanent. The aim is to have participants experience the changing nature of discomfort, depending on how they address it, and to note that the more we resist discomfort, i.e. the less we accept it, the more intrusive it becomes.
- **SOBER in a challenging situation:** This exercise once again enables participants to identify situations that present a challenge for them individually and to immediately put the SOBER exercise into practice in order to experience a break at a point where participants would normally have tended to react automatically.

- **Walking meditation:** This exercise involves walking with full awareness. This exercise can be practiced formally at home or casually while walking in everyday life. Walking is a highly automated process, and focusing attention on this activity can radically change the experience. Participants often feel embarrassed or uncomfortable when practicing this exercise because these feelings are directly linked to thoughts of self-judgement, such as "I look silly walking so slowly," which, like any other thought, can simply be let go. Thus, awareness of these reactions is part of the exercise.

4.5 Acceptance and Competent Action

This session addresses the term "acceptance." The aim is to identify the emotions triggered by difficult situations and their consequences. The meditation exercises proposed in this session are as follows:

- **Sitting meditation (sounds, breathing, sensations, thoughts, emotions):** This exercise introduces the central theme of this session, which is acceptance. It is about accepting things as they happen. Obviously, it is not about becoming passive, but about accepting the things that cannot be changed. Acceptance is a central element in mindfulness meditation. Often the things that trigger the most anxious anticipation or rumination are those that we cannot do anything about immediately. Paradoxically, it is precisely the lack of control over these situations that causes our minds to produce anticipatory thoughts or ruminate on the situation, as if our brains were constantly trying to resolve them. This search for a solution ultimately feeds the negative emotions associated with the situation. Adopting an attitude of acceptance toward them can lead to a reduction in adverse emotions.
- **SOBER in pairs:** In this exercise, participants pair up to discuss everyday concerns that can trigger cravings. They are then invited to guide each other through the SOBER exercise. This exercise can sometimes be tricky for some patients who do not wish to expose their private problems or to provide details about them to other patients. If this is the case, this exercise can be replaced by the exercise from session 4: "SOBER in a challenging situation.''
- **Mindful movements:** This exercise consists of paying mindful attention to bodily sensations during simple stretching exercises and aims at improving body awareness.

4.6 Seeing Thoughts as Thoughts

During this session, the role of thoughts in relapse is outlined. Participants are asked to identify their automatic thoughts and the way they are involved in the relapse process. It is a typical CBT exercise. The exercises in session six are as follows:

- **Thought meditation:** This exercise works by using metaphors such as leaves floating on a stream or clouds crossing the sky in order to make it easier to observe the constant coming and going of thoughts. Participants are invited to name or label their thoughts as being, e.g. a "memory" or an "anticipation." This will help them

realize that, ultimately, thoughts are comparable to objects that pass through the mind but are not necessarily a reflection of reality.
- **SOBER exercise:** see session 3.

4.7 Self-Care and Lifestyle

The aim in this session is to determine how the practice of mindfulness could improve quality of life. The participants are asked to identify the daily activities that make their lives more fulfilling. In addition to this classic CBT exercise, participants do a loving-kindness meditation in this session.

- **Loving-kindness meditation:** This is a meditation centered on compassion, kindness, and goodwill toward oneself and others.

4.8 Social Support and Practice Maintenance

The last session focuses on the importance of help and support from others, as well as continuing to practice mindfulness. The exercises in this session are as follows:

- **Body scan** followed by a reading of the poem "The Paradox."
- **The final meditation:** The meditation begins with a short moment of focus on kindness for others and oneself. The participant will receive an object, usually a stone. A meditation similar to the raisin meditation will be carried out. The participant observes the characteristics of the stone, without judgement and without being caught up in thoughts linked to it. This stone, which the participants will keep, will be a reminder of this 8-week experience and of the imperfect yet beautiful nature of the human being.

Between sessions, patients are invited to practice regularly according to the tasks that have been assigned. At the end of each session, participants are encouraged to continue practicing individually through daily formal and informal meditation exercises. Formal practice is defined as planned exercises, with or without audio support, such as the body scan or sitting meditations. In this context, the person intends to carry out an exercise and sets aside free time for the practice. Informal practice is designed to introduce mindfulness into everyday activities, such as eating a meal or brushing one's teeth.

5. CASE REPORT

Mr. C., aged 23, presents a gambling disorder associated with concomitant cannabis, alcohol, and tobacco use disorders. He has taken the MBRP program in addition to treatment as usual provided in an addiction treatment center where the first author of the present chapter was working, which included sessions with a psychiatrist and conventional CBT sessions with a psychologist. The patient was assessed before participation in the MBRP program and after the end of the program.

A detailed psychometric assessment was conducted with Mr. C. We used the Timeline Follow-Back (Sobell & Sobell, 1992) to assess time and money spent on gambling over the past 4 weeks. To assess craving frequency, we used the Craving Experience Questionnaire-Frequency (CEQ-F, May et al., 2014), and to assess craving intensity, we used the Craving Experience Questionnaire-Strength (CEQ-S; May et al., 2014). We used the Beck Depression Inventory (BDI21) (Beck, Steer, et al., 1988) to assess depressive symptoms and the Beck Anxiety Inventory (BAI; Beck, Epstein, et al., 1988) to assesses anxiety symptoms. The mindfulness trait was assessed with the Five Facets Mindfulness Questionnaire (FFMQ; Baer et al., 2008). We used the Gambling Related Cognitions Scale (Raylu & Oei, 2004) to assess the intensity of dysfunctional-related gambling cognitions and beliefs.

Lifestyle: Mr. C. was unemployed at the time of the intervention and holds a disabled worker status due to chronic back pain. He was living with his parents and is the youngest of three siblings. His relationship with his parents and siblings is described as highly conflictual. At the time of his admission to the addictology department, he had been in a relationship with his girlfriend for 6 years, and they were planning to move in together soon.

Family History: Mr. C.'s father experienced a major depressive episode in the past and presented with both alcohol and tobacco use disorder.

At the time of admission to the addiction treatment center, the patient's primary reason for seeking treatment was his gambling behavior, but he also presented with alcohol, cannabis, and tobacco use disorders. The primary objectives of his treatment were to quit gambling and reduce his alcohol use, but his objectives regarding cannabis use remained unclear at this stage. He was spending around 600 euros per month on gambling and primarily played scratch card games at bars. He was not involved in online gambling. He was particularly prone to chasing his losses, and the hope of recovering his losses through gambling was a strong factor in explaining the maintenance of his problematic gambling habits. He was drinking between 10 and 15 units of alcohol daily. Shortly before the first appointment, he had cut back on his cannabis use, stabilizing at around two joints per day, though just a few weeks before, he was smoking up to 15 joints a day. He smokes one pack of rolling tobacco every 5 days. His environment was not supportive of change, as his father's drinking habits at home often led him to offer alcohol, and the ongoing conflicts with his family frequently drove him to leave the house and visit bars, where he was exposed to gambling. In addition, he was smoking cannabis as a form of self-medication to help alleviate his physical pain. Mr. C. expressed a sense of discouragement about his situation and occasionally exhibited clinophilia.

The patient received CBT and medical appointments with a psychiatrist. During the CBT sessions, work was done on addressing the illusion of control and chasing behavior, which led him to increase his stakes, as well as selective memory. Illusion of control over chance is a significant driver of gambling and is increased by the phenomenon of selective memory (Toneatto, 1999). When gamblers experience this illusion, they believe that a

specific strategy that they implement allows them to control the outcome of the game, when in fact it is pure chance (Toneatto, 1999). Selective memory then leads them to remember only those times when the strategy was effective. In conventional CBT, these erroneous beliefs are confronted with reality and thus "restructured" (von Hammerstein et al., 2018). Cognitive restructuring is also used to reduce gambling chasing. Mr. C., like most persons with a gambling disorder, thought he would be able to stop gambling if he could recover his losses. Cognitive restructuring helped him to realize that wins tended to encourage him to pursue gambling, to reinforce erroneous beliefs, and to increase his loss of control. In addition, behavioral moderators were implemented, such as not leaving the house with a credit card, not carrying a lot of cash, not going to cafés that offer gambling, etc. He was offered the MBRP program to enhance his ability to manage cravings and better cope with his physical pain.

The patient participated in seven of eight sessions of the MBRP program. Formal mindfulness home practice is highly recommended when participating in a mindfulness program, as home practice is associated with better outcomes (Grow et al., 2015). Regular practice is also associated with neurobiological changes that promote quicker and easier access to psychological resources when someone is faced with more complex situations (Tang, Hölzel, et al., 2015; Tang, Posner, et al., 2015; Tang & Posner, 2014; Yu et al., 2021). More informal practice, which means practicing mindfulness meditation during everyday activities or in specific and more complex situations, also appears to be beneficial to some extent (Shankland et al., 2021). Mr. C. did not establish a regular formal practice but was able to use mindfulness-meditation exercises to manage high-risk situations. The most complicated situations for the patient involved conflicts with his parents, which consistently triggered craving for gambling. His usual response was to immediately leave home and gamble. During the MBRP program, Mr. C. developed a new functional coping strategy: isolating himself in his room after a conflict and practicing a mindfulness exercise, specifically the "surfing the urges" exercise, which sometimes allowed him to simply let the gambling craving pass. Concomitantly, he reduced his gambling expenditures from 600 euros before the beginning of treatment to 115 euros after the intervention.

The assessment of craving showed a decrease in frequency, with scores on the CEQ-F three times lower between the beginning and end of the program. However, the intensity score assessed by the CEQ-S, the intensity of the last craving did not decrease. An especially surprising result for this patient was the increase in scores on the Gambling Related Cognitions Scale, which rose from 103 at baseline to 152 after the intervention. These results do not align with the patient's self-report or his gambling practices. Initially, the patient held many erroneous beliefs, such as the illusion of control and the belief that he could predict the game's outcome, which sustained his gambling behavior. In contrast, after treatment, he appeared to express a more rational perspective insofar as, during individual sessions with the therapist after his participation in the

MBRP program, he expressed fewer erroneous beliefs regarding gambling, particularly concerning chasing and the illusion of control.

Mindfulness helps individuals better identify and recognize cognitive processes that may have previously gone unnoticed or were automatically followed by a behavior. One of the unique aspects of mindfulness is not just thinking, but noticing that one is thinking, which is called metacognition. This involves mentally stepping aside and observing one's mental processes and internal dialogue, thereby allowing the recognition of thoughts that might otherwise remain unnoticed or immediately reacted to. It could be suggested that, in Mr. C.'s case, he became aware of these triggering beliefs without the need to react to them by gambling. Moreover, the enhanced recognition of these beliefs may also be linked to the psychoeducational components regarding beliefs included in traditional CBT, which the patient also received.

A reduction in anxiety and depression symptoms was also observed, with scores on the BDI and BAI scales half of what they were at baseline (19 for both) at the end of treatment (8 and 9, respectively). These changes indicate that the patient was progressing from mild depression (cutoff scores for mild depression on the French BDI: 12-19) to no depression (cutoff scores for no sign of clinical depression on the French BDI: 0-11) and from moderate anxiety (cutoff scores for moderate depression on the French BAI: 19-29) to no anxiety (cutoff scores for no sign of clinical anxiety on the French BAI: 0-9) between the beginning and end of the program. These results are particularly interesting considering the patient's unstable mood at the beginning of treatment. By the end of the program, the patient reported feeling more confident and optimistic about his future. In addition, his mindfulness level improved notably with FFMQ scores having increased by a third after participation in the program. Although the patient struggled to implement a formal mindfulness practice, he reported using informal strategies to cope with intense emotions.

His relationships with his family improved as well. He explained that mindfulness helped him become less affected by his parents' remarks, which previously triggered a lot of anger. He stated that he had adopted an acceptance stance toward his parents. Furthermore, the mindfulness strategies also enabled him to better manage cravings for cannabis and alcohol. He achieved his goal of reducing alcohol consumption to very occasional use, averaging about 6 units of alcohol per month, and never exceeding 3 units on any occasion. In addition, he stopped using cannabis after the end of the program.

At 6 months after the end of the program, his medical file indicated that the patient was stable mood-wise and had maintained his abstinence from cannabis, as well as his reduced alcohol consumption. Concerning gambling, the patient had remained abstinent, with a few exceptions, limiting his expenditures to 100-150 euros per month maximum.

5.1 General conclusion

Mindfulness-based interventions are becoming increasingly popular in the treatment of behavioral addictions, including gaming disorder(Li et al., 2017; Mettler et al., 2020),

gambling disorder (de Lisle et al., 2012; Maynard et al., 2018), and compulsive sexual behavior disorder (Blycker & Potenza, 2018; Van Gordon et al., 2016). These interventions are particularly indicated when the addictive behavior is associated with emotional dysregulation and heightened impulsivity. Mindfulness-based interventions do not necessarily target one specific problematic behavior but aim for the development of psychological resources and strengths that improve the regulation of certain dysfunctional psychological processes involved in the maintenance and relapse of addictive behaviors, such as maladaptive emotion regulation strategies (e.g. rumination) or impairment of inhibitory control. In this sense, these interventions can improve well-being more generally and thus improve quality of life beyond their mere effect on addictive behavior. It remains important, however, to conduct more solid clinical studies to confirm the efficacy of mindfulness-based treatments in behavioral addictions.

REFERENCES

Antons, S., Brand, M., & Potenza, M. N. (2020). Neurobiology of cue-reactivity, craving, and inhibitory control in non-substance addictive behaviors. *Journal of the Neurological Sciences*, *415*, 116952. https://doi.org/10.1016/j.jns.2020.116952

Ayala-Rojas, R. E., Granero, R., Mora-Maltas, B., Rivas, S., Fernández-Aranda, F., Gómez-Peña, M., Moragas, L., Baenas, I., Solé-Morata, N., Menchón, J. M., & Jiménez-Murcia, S. (2022). Factors related to the dual condition of gambling and gaming disorders : A path analysis model. *Journal of Psychiatric Research*, *145*, 148-158. https://doi.org/10.1016/j.jpsychires.2021.12.005

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., Walsh, E., Duggan, D., & Williams, J. M. G. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment*, *15*(3), 329-342. https://doi.org/10.1177/1073191107313003

Bates, M. E., Buckman, J. F., & Nguyen, T. T. (2013). A Role for Cognitive Rehabilitation in Increasing the Effectiveness of Treatment for Alcohol Use Disorders. *Neuropsychology review*, *23*(1), 27-47. https://doi.org/10.1007/s11065-013-9228-3

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety : Psychometric properties. *Journal of Consulting and Clinical Psychology*, *56*(6), 893-897. https://doi.org/10.1037/0022-006X.56.6.893

Beck, A. T., Steer, R. A., & Carbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory : Twenty-five years of evaluation. *Clinical Psychology Review*, *8*(1), 77-100. https://doi.org/10.1016/0272-7358(88)90050-5

Berghoff, C. R., Pomerantz, A. M., Pettibone, J. C., Segrist, D. J., & Bedwell, D. R. (2012). The Relationship Between Experiential Avoidance and Impulsiveness in a Nonclinical Sample. *Behaviour Change*, *29*(1), 25-35. https://doi.org/10.1017/bec.2012.6

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, *97*(5), 487-499. https://doi.org/10.1046/j.1360-0443.2002.00015.x

Blycker, G. R., & Potenza, M. N. (2018). A mindful model of sexual health : A review and implications of the model for the treatment of individuals with compulsive sexual behavior disorder. *Journal of Behavioral Addictions*, *7*(4), 917-929. https://doi.org/10.1556/2006.7.2018.127

Bowen, S., Chawla, N., & Marlatt, G. A. (2011). *Mindfulness-based relapse prevention for addictive behaviors : A clinician's guide*. Guilford Press.

Bowen, S., Witkiewitz, K., Clifasefi, S. L., Grow, J., Chawla, N., Hsu, S. H., Carroll, H. A., Harrop, E., Collins, S. E., Lustyk, M. K., & Larimer, M. E. (2014). Relative efficacy of mindfulness-based relapse prevention, standard relapse prevention, and treatment as usual for substance use disorders : A randomized clinical trial. *JAMA Psychiatry*, *71*(5), 547-556. https://doi.org/10.1001/jamapsychiatry.2013.4546

Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors : Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience and Biobehavioral Reviews*, *104*, 1-10. https://doi.org/10.1016/j.neubiorev.2019.06.032

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present : Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822-848. https://doi.org/10.1037/0022-3514.84.4.822

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders. *Behaviour Research and Therapy*, *44*(9), 1251-1263. https://doi.org/10.1016/j.brat.2005.10.001

Chiorri, C., Soraci, P., & Ferrari, A. (2023). The Role of Mindfulness, Mind Wandering, Attentional Control, and Maladaptive Personality Traits in Problematic Gaming Behavior. *Mindfulness*, *14*(3), 648-670. https://doi.org/10.1007/s12671-022-02066-4

Cribb, G., Moulds, M. L., & Carter, S. (2006). Rumination and Experiential Avoidance in Depression. *Behaviour Change*, *23*(3), 165-176. https://doi.org/10.1375/bech.23.3.165

Cyders, M. A., & Smith, G. T. (2008). Emotion-based dispositions to rash action : Positive and negative urgency. *Psychological Bulletin*, *134*(6), 807-828. https://doi.org/10.1037/a0013341

Dakwar, E., Mariani, J. P., & Levin, F. R. (2011). Mindfulness impairments in individuals seeking treatment for substance use disorders. *The American Journal of Drug and Alcohol Abuse*, *37*(3), 165-169. https://doi.org/10.3109/00952990.2011.553978

de Lisle, S. M., Dowling, N. A., & Allen, J. S. (2014). Mechanisms of Action in the Relationship between Mindfulness and Problem Gambling Behaviour. *International Journal of Mental Health and Addiction*, *12*(2), 206-225. https://doi.org/10.1007/s11469-014-9475-4

de Lisle, S. M., Dowling, N. A., & Allen, J. S. (2012). Mindfulness and problem gambling : A review of the literature. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, *28*(4), 719-739. https://doi.org/10.1007/s10899-011-9284-7

Eben, C., Billieux, J., & Verbruggen, F. (2020). Clarifying the Role of Negative Emotions in the Origin and Control of Impulsive Actions. *Psychologica Belgica*, *60*(1). https://doi.org/10.5334/pb.502

García-Oliva, C., & Piqueras, J. A. (2016). Experiential Avoidance and Technological Addictions in Adolescents. *Journal of Behavioral Addictions*, *5*(2), 293-303. https://doi.org/10.1556/2006.5.2016.041

Garland, S. N., Carlson, L. E., Cook, S., Lansdell, L., & Speca, M. (2007). A non-randomized comparison of mindfulness-based stress reduction and healing arts programs for facilitating post-traumatic growth and spirituality in cancer outpatients. *Supportive Care in Cancer*, *15*(8), 949-961. https://doi.org/10.1007/s00520-007-0280-5

Gong, L., Zhou, H., Su, C., Geng, F., Xi, W., Teng, B., Yuan, K., Zhao, M., & Hu, Y. (2022). Self-control impacts symptoms defining Internet gaming disorder through dorsal anterior cingulate–ventral striatal pathway. *Addiction Biology*, *27*(5), e13210. https://doi.org/10.1111/adb.13210

Gordon, J. R., & Marlatt, G. A. (1985). *Relapse Prevention : Maintenance Strategies in the Treatment of Addictive Behaviors*. Guilford Press.

Grant, J. E., Odlaug, B. L., & Chamberlain, S. R. (2016). Neural and psychological underpinnings of gambling disorder : A review. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *65*, 188-193. https://doi.org/10.1016/j.pnpbp.2015.10.007

Grow, J. C., Collins, S. E., Harrop, E. N., & Marlatt, G. A. (2015). Enactment of home practice following mindfulness-based relapse prevention and its association with substance-use outcomes. *Addictive Behaviors*, *40*, 16-20. https://doi.org/10.1016/j.addbeh.2014.07.030

Hayes, S. C., & Hofmann, S. G. (2017). The third wave of cognitive behavioral therapy and the rise of process-based care. *World Psychiatry: Official Journal of the World Psychiatric Association (WPA)*, *16*(3), 245-246. https://doi.org/10.1002/wps.20442

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experimental avoidance and behavioral disorders : A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, *64*(6), 1152-1168. https://doi.org/10.1037//0022-006x.64.6.1152

Hodgins, D. C. (2004). Using the NORC DSM Screen for Gambling Problems as an outcome measure for pathological gambling : Psychometric evaluation. *Addictive Behaviors*, *29*(8), 1685-1690. https://doi.org/10.1016/j.addbeh.2004.03.017

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based

therapy on anxiety and depression : A meta-analytic review. *Journal of Consulting and Clinical Psychology*, *78*(2), 169-183. https://doi.org/10.1037/a0018555

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry research*, *191*(1), 36-43. https://doi.org/10.1016/j.pscychresns.2010.08.006

Kabat-Zinn, J., University of Massachusetts Medical Center/Worcester, & Stress Reduction Clinic. (1991). *Full catastrophe living : Using the wisdom of your body and mind to face stress, pain, and illness*. Pub. by Dell Pub., a division of Bantam Doubleday Dell Pub. Group.

Kennedy, J. C., Dunlop, B. W., Craighead, L. W., Nemeroff, C. B., Mayberg, H. S., & Craighead, W. E. (2022). Assessing in-session rumination and its effects on CBT for depression. *Behaviour Research and Therapy*, *159*, 104209. https://doi.org/10.1016/j.brat.2022.104209

King, D. L., Delfabbro, P. H., Wu, A. M. S., Doh, Y. Y., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2017). Treatment of Internet gaming disorder : An international systematic review and CONSORT evaluation. *Clinical Psychology Review*, *54*, 123-133. https://doi.org/10.1016/j.cpr.2017.04.002

Kober, H., Buhle, J., Weber, J., Ochsner, K. N., & Wager, T. D. (2019). Let it be : Mindful acceptance down-regulates pain and negative emotion. *Social Cognitive and Affective Neuroscience*, *14*(11), 1147-1158. https://doi.org/10.1093/scan/nsz104

Leeman, R. F., & Potenza, M. N. (2012). Similarities and Differences between Pathological Gambling and Substance Use Disorders : A Focus on Impulsivity and Compulsivity. *Psychopharmacology*, *219*(2), 469-490. https://doi.org/10.1007/s00213-011-2550-7

Li, W., Garland, E. L., McGovern, P., O'Brien, J. E., Tronnier, C., & Howard, M. O. (2017). Mindfulness-oriented recovery enhancement for internet gaming disorder in U.S. adults : A stage I randomized controlled trial. *Psychology of Addictive Behaviors*, *31*(4), 393-402. https://doi.org/10.1037/adb0000269

Linehan, M. M., Dimeff, L. A., Reynolds, S. K., Comtois, K. A., Welch, S. S., Heagerty, P., & Kivlahan, D. R. (2002). Dialectical behavior therapy versus comprehensive validation therapy plus 12-step for the treatment of opioid dependent women meeting criteria for borderline personality disorder. *Drug and Alcohol Dependence*, *67*(1), 13-26.

Luijten, M., Machielsen, M. W. J., Veltman, D. J., Hester, R., Haan, L. de, & Franken, I. H. A. (2014). Systematic review of ERP and fMRI studies investigating inhibitory control and error processing in people with substance dependence and behavioural addictions. *Journal of Psychiatry & Neuroscience : JPN*, *39*(3), 149. https://doi.org/10.1503/jpn.130052

MacAulay, R. K., Halpin, A., Andrews, H. E., & Boeve, A. (2022). Trait mindfulness associations with executive function and well-being in older adults. *Aging & Mental Health*, *26*(12), 2399-2406. https://doi.org/10.1080/13607863.2021.1998352

MacKillop, J., Amlung, M. T., Few, L. R., Ray, L. A., Sweet, L. H., & Munafò, M. R. (2011). Delayed reward discounting and addictive behavior : A meta-analysis. *Psychopharmacology*, *216*(3), 305-321. https://doi.org/10.1007/s00213-011-2229-0

Magill, M., & Ray, L. A. (2009). Cognitive-Behavioral Treatment With Adult Alcohol and Illicit Drug Users : A Meta-Analysis of Randomized Controlled Trials. *Journal of Studies on Alcohol and Drugs*, *70*(4), 516-527.

Maier, M. J., Schiel, J. E., Rosenbaum, D., Hautzinger, M., Fallgatter, A. J., & Ehlis, A.-C. (2021). To Regulate or Not to Regulate : Emotion Regulation in Participants With Low and High Impulsivity. *Frontiers in Behavioral Neuroscience*, *15*. https://doi.org/10.3389/fnbeh.2021.645052

Mallorquí-Bagué, N., Mestre-Bach, G., Lozano-Madrid, M., Fernandez-Aranda, F., Granero, R., Vintró Alcaraz, C., Del Pino-Gutiérrez, A., Steward, T., Gómez-Peña, M., Aymamí, N., Mena-Moreno, T., Menchón, J. M., & Jiménez-Murcia, S. (2018). Trait impulsivity and cognitive domains involving impulsivity and compulsivity as predictors of gambling

disorder treatment response. *Addictive Behaviors*, *87*, 169-176. https://doi.org/10.1016/j.addbeh.2018.07.006

May, J., Andrade, J., Kavanagh, D. J., Feeney, G. F. X., Gullo, M. J., Statham, D. J., Skorka-Brown, J., Connolly, J. M., Cassimatis, M., Young, R. McD., & Connor, J. P. (2014). The Craving Experience Questionnaire : A brief, theory-based measure of consummatory desire and craving. *Addiction*, *109*(5), 728-735. https://doi.org/10.1111/add.12472

Maynard, B. R., Wilson, A. N., Labuzienski, E., & Whiting, S. W. (2018). Mindfulness-Based Approaches in the Treatment of Disordered Gambling : A Systematic Review and Meta-Analysis. *Research on Social Work Practice*, *28*(3), 348-362. https://doi.org/10.1177/1049731515606977

McLaughlin, K. A., & Nolen-Hoeksema, S. (2011). Rumination as a transdiagnostic factor in depression and anxiety. *Behaviour Research and Therapy*, *49*(3), 186-193. https://doi.org/10.1016/j.brat.2010.12.006

McLellan, A. T., Lewis, D. C., O'Brien, C. P., & Kleber, H. D. (2000). Drug dependence, a chronic medical illness : Implications for treatment, insurance, and outcomes evaluation. *JAMA*, *284*(13), 1689-1695.

Mettler, J., Mills, D. J., & Heath, N. L. (2020). Problematic Gaming and Subjective Well-Being : How Does Mindfulness Play a Role? *International Journal of Mental Health and Addiction*, *18*(3), 720-736. https://doi.org/10.1007/s11469-018-9978-5

Miniati, M., Orrù, G., Paroli, M., Cinque, M., Paolicchi, A., Gemignani, A., Perugi, G., Ciacchini, R., Marazziti, D., Palagini, L., & Conversano, C. (2023). Patients with Chronic Pain : Are Mindfulness Traits Protective Against Distress, Anxiety and Depression? *Clinical Neuropsychiatry*, *20*(5), 429-441. https://doi.org/10.36131/cnfioritieditore20230505

Newman, M. G., & Llera, S. J. (2011). A novel theory of experiential avoidance in generalized anxiety disorder : A review and synthesis of research supporting a contrast avoidance model of worry. *Clinical Psychology Review*, *31*(3), 371-382. https://doi.org/10.1016/j.cpr.2011.01.008

Nicholson, R., Mackenzie, C., Afifi, T. O., Keough, M., & Sareen, J. (2019). An Examination of Comorbid Psychiatric Disorders in Disordered Gamblers Versus Other Substance-Related Disorders. *Journal of Gambling Studies*, *35*(3), 829-847. https://doi.org/10.1007/s10899-019-09839-y

Noël, X., Van der Linden, M., d'Acremont, M., Bechara, A., Dan, B., Hanak, C., & Verbanck, P. (2007). Alcohol cues increase cognitive impulsivity in individuals with alcoholism. *Psychopharmacology*, *192*(2), 291-298. https://doi.org/10.1007/s00213-006-0695-6

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, *109*(3), 504-511.

Pfund, R. A., Ginley, M. K., Kim, H. S., Boness, C. L., Horn, T. L., & Whelan, J. P. (2023). Cognitive-behavioral treatment for gambling harm : Umbrella review and meta-analysis. *Clinical Psychology Review*, *105*, 102336. https://doi.org/10.1016/j.cpr.2023.102336

Piet, J., & Hougaard, E. (2011). The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder : A systematic review and meta-analysis. *Clinical Psychology Review*, *31*(6), 1032-1040. https://doi.org/10.1016/j.cpr.2011.05.002

Raylu, N., & Oei, T. P. S. (2004). The Gambling Related Cognitions Scale (GRCS) : Development, confirmatory factor validation and psychometric properties. *Addiction*, *99*(6), 757-769. https://doi.org/10.1111/j.1360-0443.2004.00753.x

Rogier, G., L, M., Nicola, D., & P, V. (2018). *Positive and negative urgency among addicted gamblers : The role of emotional suppression*. https://iris.uniroma1.it/handle/11573/1177109

Sala, M., Rochefort, C., Lui, P. P., & Baldwin, A. S. (2020). Trait mindfulness and health behaviours : A meta-analysis. *Health Psychology Review*, *14*(3), 345-393. https://doi.org/10.1080/17437199.2019.1650290

Sancho, M., De Gracia, M., Rodríguez, R. C., Mallorquí-Bagué, N., Sánchez-González, J., Trujols, J., Sánchez, I., Jiménez-Murcia, S., & Menchón, J. M. (2018). Mindfulness-Based Interventions for the Treatment of Substance and Behavioral Addictions : A Systematic Review. *Frontiers in Psychiatry*, *9*, 95. https://doi.org/10.3389/fpsyt.2018.00095

Schettler, L. M., Thomasius, R., & Paschke, K. (2024). Emotional dysregulation predicts problematic gaming in children and youths : A cross-sectional and longitudinal approach. *European Child & Adolescent Psychiatry*, *33*(2), 605-616. https://doi.org/10.1007/s00787-023-02184-x

Schneekloth, T. D., Biernacka, J. M., Hall-Flavin, D. K., Karpyak, V. M., Frye, M. A., Loukianova, L. L., Stevens, S. R., Drews, M. S., Geske, J. R., & Mrazek, D. A. (2012). Alcohol craving as a predictor of relapse. *The American Journal on Addictions*, *21 Suppl 1*, S20-26. https://doi.org/10.1111/j.1521-0391.2012.00297.x

Segal, Z. V., Williams, J. Mark G, & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression : A new approach to preventing relapse*. Guilford Press.

Selby, E. A., Anestis, M. D., & Joiner, T. E. (2008). Understanding the relationship between emotional and behavioral dysregulation : Emotional cascades. *Behaviour Research and Therapy*, *46*(5), 593-611. https://doi.org/10.1016/j.brat.2008.02.002

Shankland, R., Tessier, D., Strub, L., Gauchet, A., & Baeyens, C. (2021). Improving Mental Health and Well-Being through Informal Mindfulness Practices : An Intervention Study. *Applied Psychology: Health and Well-Being*, *13*(1), 63-83. https://doi.org/10.1111/aphw.12216

Shirk, S. D., Muquit, L. S., Deckro, J., Sweeney, P. J., & Kraus, S. W. (2022). Mindfulness-Based Relapse Prevention for the Treatment of Gambling Disorder among U.S. Military Veterans : Case Series and Feasibility. *Clinical Case Studies*, *21*(1), 3-17. https://doi.org/10.1177/15346501211020122

Smith, D. P., Battersby, M. W., Pols, R. G., Harvey, P. W., Oakes, J. E., & Baigent, M. F. (2013). Predictors of Relapse in Problem Gambling : A Prospective Cohort Study. *Journal of Gambling Studies*, *31*(1), 299-313. https://doi.org/10.1007/s10899-013-9408-3

Sobell, L. C., & Sobell, M. B. (1992). Timeline Follow-Back. In R. Z. Litten & J. P. Allen (Éds.), *Measuring Alcohol Consumption* (p. 41-72). Humana Press. https://doi.org/10.1007/978-1-4612-0357-5_3

Stellern, J., Xiao, K. B., Grennell, E., Sanches, M., Gowin, J. L., & Sloan, M. E. (2023). Emotion regulation in substance use disorders : A systematic review and meta-analysis. *Addiction*, *118*(1), 30. https://doi.org/10.1111/add.16001

Tang, Y.-Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience*, *16*(4), 213-225. https://doi.org/10.1038/nrn3916

Tang, Y.-Y., & Posner, M. I. (2014). Training brain networks and states. *Trends in Cognitive Sciences*, *18*(7), 345-350. https://doi.org/10.1016/j.tics.2014.04.002

Tang, Y.-Y., Posner, M. I., Rothbart, M. K., & Volkow, N. D. (2015). Circuitry of self-control and its role in reducing addiction. *Trends in Cognitive Sciences*, *19*(8), 439-444. https://doi.org/10.1016/j.tics.2015.06.007

Testa, G., Granero, R., Misiolek, A., Vintró-Alcaraz, C., Mallorqui-Bagué, N., Lozano-Madrid, M., Heras, M. V. D. L., Sánchez, I., Jiménez-Murcia, S., & Fernández-Aranda, F. (2022). Impact of Impulsivity and Therapy Response in Eating Disorders from a Neurophysiological, Personality and Cognitive Perspective. *Nutrients*, *14*(23), Article 23. https://doi.org/10.3390/nu14235011

Toneatto, T. (1999). Cognitive Psychopathology of Problem Gambling. *Substance Use & Misuse*, *34*(11), 1593-1604. https://doi.org/10.3109/10826089909039417

Van Gordon, W., Shonin, E., & Griffiths, M. D. (2016). Meditation Awareness Training for the Treatment of Sex Addiction : A Case Study. *Journal of Behavioral Addictions*, *5*(2), 363-372. https://doi.org/10.1556/2006.5.2016.034

Velotti, P., Rogier, G., Beomonte Zobel, S., & Billieux, J. (2021). Association between gambling disorder and emotion (dys)regulation : A systematic review and meta-analysis. *Clinical*

Psychology Review, *87*, 102037. https://doi.org/10.1016/j.cpr.2021.102037

Verdejo-García, A., Lawrence, A. J., & Clark, L. (2008). Impulsivity as a vulnerability marker for substance-use disorders : Review of findings from high-risk research, problem gamblers and genetic association studies. *Neuroscience and Biobehavioral Reviews*, *32*(4), 777-810. https://doi.org/10.1016/j.neubiorev.2007.11.003

von Hammerstein, C., Miranda, R., Aubin, H.-J., Romo, L., Khazaal, Y., Benyamina, A., & Luquiens, A. (2018). Mindfulness and Cognitive Training in a CBT-resistant Patient With Gambling Disorder : A Combined Therapy to Enhance Self-control. *Journal of Addiction Medicine*, *12*(6), 484-489. https://doi.org/10.1097/ADM.0000000000000433

von Hammerstein, C. , Khazaal, Y., Dupuis, M., Aubin, H.-J., Benyamina, A., Luquiens, A., & Romo, L. (2019). Feasibility, acceptability and preliminary outcomes of a mindfulness-based relapse prevention program in a naturalistic setting among treatment-seeking patients with alcohol use disorder : A prospective observational study. *BMJ Open*, *9*(5), e026839. https://doi.org/10.1136/bmjopen-2018-026839

Watkins, E. R. (2009). Depressive rumination : Investigating mechanisms to improve cognitive behavioural treatments. *Cognitive Behaviour Therapy*, *38 Suppl 1*(S1), 8-14. https://doi.org/10.1080/16506070902980695

Wegner, D. M. (2011). Setting free the bears : Escape from thought suppression. *The American Psychologist*, *66*(8), 671-680. https://doi.org/10.1037/a0024985

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-being. *Journal of Research in Personality*, *43*(3), 374-385. https://doi.org/10.1016/j.jrp.2008.12.008

Wilcox, C. E., Dekonenko, C. J., Mayer, A. R., Bogenschutz, M. P., & Turner, J. A. (2014). Cognitive control in alcohol use disorder : Deficits and clinical relevance. *Reviews in the Neurosciences*, *25*(1), 1. https://doi.org/10.1515/revneuro-2013-0054

Yu, J., Rawtaer, I., Feng, L., Fam, J., Kumar, A. P., Kee-Mun Cheah, I., Honer, W. G., Su, W., Lee, Y. K., Tan, E. C., Kua, E. H., & Mahendran, R. (2021). Mindfulness intervention for mild cognitive impairment led to attention-related improvements and neuroplastic changes : Results from a 9-month randomized control trial. *Journal of Psychiatric Research*, *135*, 203-211. https://doi.org/10.1016/j.jpsychires.2021.01.032

Zajac, K., Ginley, M. K., & Chang, R. (2020). Treatments of internet gaming disorder : A systematic review of the evidence. *Expert Review of Neurotherapeutics*, *20*(1), 85-93. https://doi.org/10.1080/14737175.2020.1671824

IV

SPECIAL CONTRIBUTIONS

22

FINDING BALANCE IN THE STREAMING ERA: UNDERSTANDING, ADDRESSING, AND PREVENTING PROBLEMATIC BINGE-WATCHING PATTERNS

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ABSTRACT:

In recent years, binge-watching (i.e., watching multiple episodes of TV series in one session) has become a widespread pattern of TV series consumption because of the availability of on-demand streaming platforms such as Netflix, Amazon Prime, and Disney+, which allow 24-hour access to almost unlimited content. Although these developments offer undeniable advantages to the user's entertainment experience, there is increasing recognition that dysregulated binge-watching can be harmful. With its expanding prevalence has come a growing tendency to view binge-watching as a potential addictive disorder, thus engendering risks of pathologization and stigmatization. This chapter reviews and discusses the available knowledge about binge-watching by addressing three areas of consideration. First, it provides an overview of the psychosocial implications of binge-watching by highlighting its demonstrated effects and correlates, including on mental and physical health fronts. Second, key findings about the underlying psychological factors driving intensive —but healthy— and problematic binge-watching, and the specific processes that best differentiate the two, are summarized, attesting to the relevance of a motivational framework. Third, the chapter concludes by considering relevant avenues in developing effective interventions and preventive measures aimed at mitigating problematic binge-watching. Implications for future research directions are also underscored.

KEYWORDS:

binge-watching, TV series, streaming platforms, correlates, psychological processes, motivations

1. INTRODUCTION

The use of on-demand viewing and online streaming services such as Netflix, Amazon Prime Video, or Disney+ dominates TV series viewing routines, becoming the leading way of consuming this type of content (Statista, 2024) and causing profound changes in how viewers engage with TV shows. The permanent access, regardless of time and place, to almost endless content options afforded by these platforms has led to the widespread adoption of binge-watching (i.e., watching multiple episodes of TV series in one session), which now tends to be the norm rather than the exception in viewing practices. Indeed, according to both market data reports and scientific studies, the flexibility offered by modern viewing habits has resulted in more than 70% of TV series viewers regularly binge-watching TV shows (Flayelle et al., 2020; Gitnux Report, 2024; Hamza et al., 2023; Kuppusamy et al., 2023). Such expansion of binge-watching has consequently attracted significant scholarly interest in recent years, with particular attention being devoted to the question of its impact on viewers (Flayelle et al., 2020; Ilyas et al., 2023; Starosta & Izydorczyk, 2020).

Available relevant studies on this subject demonstrate that, in comparison with traditional appointment viewing (i.e., when one had to tune in to TV series at the time they were broadcasted on TV), binge-watching provides TV series viewers with a distinct entertainment experience characterized by heightened cognitive and emotional participation that typically yields a whole range of positive effects on their well-being (Granow et al., 2018; Pittman & Steiner, 2021; Tukachinsky & Eyal, 2018). Concurrently, however, existing research suggests that this viewing pattern may be associated with instances of loss of control over time spent watching (Castro et al., 2021; Lades et al., 2022; Riddle et al., 2018), which can then translate into genuine negative consequences in TV series viewers' daily lives (Alfonsi et al., 2023; Rubenking et al., 2018; Tolba & Zoghaib, 2022). In that regard, many researchers have rapidly focused attention on the presumed addictive potential of binge-watching (e.g., Forte et al., 2021; Ilyas et al., 2023; Mento et

al., 2024; Ort et al., 2021; Riddle et al., 2018) —a perspective that has been increasingly controversial for the non-negligible risks of pathologization and stigmatization that it entails (Flayelle et al., 2019a, 2022a; Nanda & Banerjee, 2020).

The current chapter aims to address this ongoing issue by presenting a summary of existing knowledge about binge-watching in three critical areas. First, it provides a detailed overview of the mixed effects and correlates of binge-watching behavior that have been evidenced so far in the scientific literature. Next, it examines key findings about the psychological processes that are most accountable for making sense of such a contrast in outcomes, thus highlighting the critical importance not only of differentiating between intensive —but healthy— and problematic binge-watching, but also of envisaging more sound alternative conceptualizations to addiction for the problematic viewing pattern. Finally, from such a framework of understanding, it outlines relevant avenues for addressing and preventing problematic binge-watching patterns.

2. THE EFFECTS AND CORRELATES OF BINGE-WATCHING: A TWO-SIDED ISSUE REQUIRING A NUANCED PERSPECTIVE

A review of the academic literature on binge-watching shows overwhelming evidence that such a media consumption style can lead to contrasting outcomes. On the one hand, research findings indicate that binge-watching enhances both viewers' narrative immersion and overall enjoyment/engagement while TV series viewing,[1] thus providing individuals with particularly rewarding and fulfilling entertainment experiences (Anghelcev et al., 2021; Erickson et al., 2019; Merrill & Rubenking, 2019) that could benefit their psychological well-being (Flayelle et al., 2017; Pittman & Steiner, 2021; Tukachinsky & Eyal, 2018). Strengthening this impact is also the fact that, when characterized by self-determined use, binge-watching not only enhances feelings of autonomy, competence, and relatedness (Erdmann & Dienlin, 2022; Granow et al., 2018), but also promotes social engagement, given that popular TV series constitute a topic that brings people together and fosters discussion (Anghelcev et al., 2022; Chang & Peng, 2022; Flayelle et al., 2017; Rubenking & Bracken, 2021). On the other hand, studies' results simultaneously reveal that the experience of binge-watching may also involve subsequent "binge regret" and feelings of guilt (Granow et al., 2018; Lades et al., 2022; Martínez-Serrano et al., 2023; Pittman & Steiner, 2021), thus testifying to a loss of control over time spent viewing as experienced by some TV series viewers (Castro et al., 2021; Lades et al., 2022; Riddle et al., 2018), which, if continued over a prolonged period, could have detrimental effects on their well-being. Indeed, various negative correlates of binge-watching can be identified in the scientific literature on this subject, whether in the sphere of health issues primarily

1 It must be acknowledged, however, that this positive effect was recently not demonstrated in experimental and field settings (Wirz et al., 2023).

due to physical inactivity (e.g., thrombosis and pulmonary embolism; Kubota et al., 2018; Rangarajan & Forman, 2019), poor eating habits (Brookes & Ellithorpe, 2017; Vaterlaus et al., 2019), sleep disturbances (Alfonsi et al., 2023; Anghelcev et al., 2022; Exelmans & Van den Bulck, 2017; Forte et al., 2023), reduced academic and professional productivity (Anghelcev et al., 2022; Paschke et al., 2022; Qayyoum & Mallik, 2023; Rubenking et al., 2018), social isolation (Alfonsi et al., 2023; Rosli & Mohd Mahudin, 2024), or increased mental health concerns such as anxiety and depression (Akram et al., 2024; Billaux et al., 2022; Elkholy et al., 2024; Paschke et al., 2022; Starosta et al., 2021; Sun & Chang, 2021; Tolba & Zoghaib, 2022; Yu & Alizadeh, 2024).

In light of this observation, multiple research efforts have been undertaken to investigate binge-watching through the lens of (behavioral or non-substance-related) addictions (Dieterich et al., 2021; Forte et al., 2021; Paschke et al., 2022; Riddle et al., 2018; Starosta et al., 2019), a conceptual stance that has been repeatedly criticized because of the risks of over-pathologization and stigmatization that it entails for a screen-based leisure activity that has become so massively popular (Flayelle et al., 2019a, 2022a; Nanda & Banerjee, 2020). To counter this undesirable effect, authors of other studies have insisted on the need for binge-watching research to follow two enhancing tracks. The first consists of systematically differentiating between elevated (yet non-problematic) and problematic forms of engagement in this activity, a primary consideration for understanding its mixed relationship with psychological well-being. The second involves investigating the specific underlying psychological mechanisms that best discriminate between the two forms (Billaux et al., 2023; Flayelle et al., 2020, 2022a; Richard & Plante, 2024; Steins-Loeber et al., 2020). As is being advocated for other addictive-like technology-mediated behaviors, the adoption of such a process-based approach offers the most reliable way forward to gain an adequate understanding of the origins and primary nature of these emerging conditions, thereby avoiding the rapid and easy generation of inaccurate addiction diagnoses while ensuring that they are addressed psychotherapeutically in the most effective way (Flayelle et al., 2022b; James & Tunney, 2017; Kardefelt-Winther et al., 2017). In keeping with this goal, the following section provides an overview of the current state of knowledge about which core psychological processes potentially lie behind non-harmful involvement in binge-watching, on the one hand, and a problematic pattern of binge-watching, on the other.

3. INTENSIVE AND PROBLEMATIC BINGE-WATCHING: THE RELEVANCE OF A MOTIVATIONAL LENS IN UNDERSTANDING DIVERGING OUTCOMES

A core postulate of one of the foundational theoretical frameworks for studying the psychology of media use and its effects, the uses and gratifications theory (Katz et al., 1973; Rubin, 2009), is that individuals' media entertainment use is primarily governed

by the intentional fulfillment of diverse sociopsychological needs. Along these lines, if it can be assumed that people differ in their own underlying drivers of media use, how much more must these differences apply to clear-cut variations in their recreational media engagement patterns and associated outcomes? The least one can say is that this holds especially true in the case of binge-watching.

Consistent with the observation that binge-watching involves higher levels of viewing enjoyment (Anghelcev et al., 2021; Erickson et al., 2019; Granow et al., 2018), there is overall agreement in the scientific literature that hedonistic motivations (i.e., when TV series viewers are motivated to binge-watch for emotion-enhancing reasons, such as entertainment seeking) not only act as a primary driver of binge-watching (Castro et al., 2021; Merrill & Rubenking, 2019; Pittman & Sheehan, 2015; Qayyoum & Mallik, 2023; Starosta et al., 2019), but also characterize non-problematic patterns of involvement in this behavior (Flayelle et al., 2022a; Richard & Plante, 2024). In a similar vein, further motives related to other known derived benefits of binge-watching, in particular personal enrichment and social connections, appear to play the same roles (Anghelcev et al., 2022; Flayelle et al., 2017, 2022a; Richard & Plante, 2024; Shim & Kim, 2018). This observation led some authors to infer that, at its core, positive reinforcement[2] mechanisms drive non-harmful engagement in binge-watching (Flayelle et al., 2022a). Nevertheless, if regulated binge-watchers engage in this leisure activity to benefit from its various gratifying effects, all of which revolve around the promotion of positive affect and emotional well-being, problematic binge-watchers, in contrast, appear to essentially make use of this viewing practice to cope with negative affective states (Alfonsi et al., 2023; Flayelle et al., 2022a; Gadino et al., 2024; Panda & Pandey, 2017; Petriuc & Drugas, 2024; Richard & Plante, 2024; Starosta et al., 2019; Wingralek et al., 2024). Notably, this continued observation across motivational studies of binge-watching goes hand in hand with further evidence demonstrating its links with emotional dysregulation (Alfonsi et al., 2023; Billaux et al., 2022), cyclothymic temperament, and low emotional stability (Mento et al., 2024; Starosta et al., 2021). Additionally, factors such as increased negative affect, including loneliness, anxiety, depression (Billaux et al., 2022; Elkholy et al., 2024; Flayelle et al., 2019b; Gadino et al., 2024; Paschke et al., 2022; Starosta et al., 2021; Sun & Chang, 2021; Tolba & Zoghaib, 2022; Wingralek et al., 2024; Yu & Alizadeh, 2024), and fear of missing out (i.e., the apprehension that others are having rewarding experiences from which one is absent; Anghelcev et al., 2022; Qayyoum & Mallik, 2023), further contribute as key determinants of problematic binge-watching. Negative reinforcement[3] mechanisms thus seem to underly problematic involvement in binge-watching, which most likely operates as a maladaptive coping or emotion regulation strategy (Billaux et

2 Refers to a psychological mechanism where engaging in a particular behavior results in desirable outcomes, thus increasing the likelihood of repeating that behavior in the future.

3 Refers to a psychological mechanism where engaging in a particular behavior results in the reduction of unpleasant emotions or states, thereby increasing the likelihood of engaging in that behavior again in similar circumstances.

al., 2022; Flayelle et al., 2019a, 2022a; Rubenking et al., 2018), a working assumption that has been especially put forward under the exceptional COVID-19 epidemic circumstances, which were associated with a marked growth in binge-watching behaviors (e.g., Boursier et al., 2021; Mowen & Heitkamp, 2022; Sigre-Leirós et al., 2023).

As a result, the consideration and analysis of (positively reinforcing versus negatively reinforcing) underlying motivations driving binge-watchers for now governs our comprehension of the duality inherent in the experience and outcomes of this viewing practice that can be both potentially beneficial and potentially harmful to them. In the latter case, such a prevailing fact underscores the critical importance of understanding the reasons behind problematic binge-watching before prematurely drawing conclusions about an addiction diagnosis. Along the same lines, and in keeping with others who have raised questions as to whether the concept of addiction reliably applies to problematic online behaviors (Billieux et al., 2015, 2022; Flayelle et al., 2022b; Kardefelt-Winther et al., 2017), some authors have highlighted the relevance of a motivational framework to improve the understanding of dysregulated use of specific internet services and applications (Kardefelt-Winther, 2014; Schimmenti, 2023). By conceiving the internet not merely as a tool, but as a genuine environment within which individuals pursue potential strategies for the articulation and satisfaction of their unmet needs in other life areas, this approach posits that people who engage in specific online activities in a dysregulated manner primarily do so to escape real-life problems or to manage and alleviate negative emotional states (Giardina et al., 2024; Schimmenti, 2023). Such a perspective thus detracts the focus from the online activity as the problem in itself, and instead redirects it to the particular individuals who, in all their uniqueness, express something of their psychopathological dynamics in the digital realm.

Nonetheless, this perspective does not dispute the fact that there might also be addictive qualities to on-demand viewing and streaming platforms that possibly make their usage dysregulated and problematic, as these online applications may be purposefully designed to influence users' capacity to exert control over how they engage with and use these services (Chaudhary et al., 2022; Flayelle et al., 2023; Schaffner et al., 2023). In direct connection with this, the fact that higher levels of impulsivity and lower levels of trait self-control are among the most defining personality-related individual differences in problematic binge-watchers (Dieterich et al., 2021; Flayelle et al., 2019b; Lades et al., 2022; Richard & Plante, 2024; Riddle et al., 2018; Steins-Loeber et al., 2020) only reinforces the current need to empirically examine this area of concern to allow for a full-scope understanding of how and why problematic patterns of binge-watching develop and worsen at a given timepoint. In this regard, it is worth mentioning a recent study that applied a descriptive auditing method to seven popular streaming platforms and identified 29 relevant platform design features (e.g., autoplay, notifications, personalized recommendation of content) that are likely to act as a challenge to TV series viewers' self-control abilities and thus to play a pivotal role in the development and maintenance of problematic forms of binge-watching (Flayelle et al., 2026). These findings provide a

foundation for future empirical research efforts falling within a process-based approach to binge-watching to explore and test the necessarily complex interactions between streaming platform design features and key user-related determinants (such as TV series watching motivations or individual vulnerabilities) that underlie dysregulated patterns of involvement in this activity.

4. ADDRESSING AND PREVENTING PROBLEMATIC BINGE-WATCHING PATTERNS

Two main paths for action should be given priority in interventions and preventive strategies to address the potentially harmful effects of problematic binge-watching. As outlined, fundamentally, the adoption of a motivational lens for analyzing this viewing pattern is most likely to result in improved case formulation and tailored treatment approaches through the provision of alternative conceptualizations to addiction that could supply a more suitable account for the sources of the symptoms associated with dysregulated binge-watching practices. The available research evidence primarily suggests that clinical interventions should focus on improving emotion regulation strategies in problematic binge-watchers (Boursier et al., 2021; Flayelle et al., 2022a; Sigre-Leirós et al., 2023) by, for example, helping these viewers to identify emotional states (e.g., stress, anxiety) that may prompt them to engage in excessive viewing sessions, and then to develop alternative (healthier) coping methods. The validity and efficacy of such an approach remains, however, to be empirically demonstrated.

Regarding prevention, efforts should also revolve around helping TV series viewers efficiently self-regulate their engagement in binge-watching by balancing the enjoyment inherent in this activity with healthy habits that could prevent them from developing dysregulated binge-watching patterns likely to have a negative impact both on their daily routines and on their physical or mental health. If research were to confirm a positive effect of streaming platform design features on uncontrolled binge-watching practices (a growingly prevalent assumption among researchers in this field; Chaudhary et al., 2022; Flayelle et al., 2023; Schaffner et al., 2023), providing viewers with evidence-based educational guidelines on effective self-control strategies to develop healthier binge-watching patterns would be of particular value. This support would be, of course, without counting on the proactive role that streaming platforms might also play to this end by developing more responsible design practices over time or by integrating relevant harm-minimization features.

5. CONCLUSION

Although the rise of on-demand streaming platforms has revolutionized the way that we consume entertainment, binge-watching has stood out as a modern and unique TV series viewing pattern over recent years. Binge-watching itself is not inherently harmful and can involve a whole series of beneficial effects. However, it can become problematic under certain conditions, and efforts should be directed toward fostering healthy binge-viewing habits without pathologizing and stigmatizing this widespread behavior. Accordingly, the available knowledge about binge-watching demonstrates that, instead of rushing to label it as a potential addictive disorder, alternative conceptualizations that focus on emotional regulation and the reasons behind problematic binge-watching should be adopted. These concepts are far more likely to help in designing tailored interventions that address the root causes of this behavior when dysregulated, without overlooking potential industry responsibility, as streaming technologies may deliberately promote such a pattern of binge-watching.

REFERENCES

Akram, H., Qamar, A., & Adnan, M. (2024). The motivation behind binge-watching practices: Impact on health in Pakistan. *Journal of Development and Social Sciences*, *5*, 1–10. https://doi.org/10.47205/jdss.2024(5-II)01

Alfonsi, V., Varallo, G., Scarpelli, S., Gorgoni M, Filosa M, De Gennaro L, Musetti A, & Franceschini C. (2023). 'This is the last episode': The association between problematic binge-watching and loneliness, emotion regulation, and sleep-related factors in poor sleepers. *Journal of Sleep Research*, *32*, Article e13747. https://doi.org/10.1111/jsr.13747

Anghelcev, G., Sar, S., Martin, J., & Moultrie, J. L. (2021). Binge-watching serial video content: Exploring the subjective phenomenology of the binge-watching experience. *Mass Communication and Society*, *24*, 130–154. https://doi.org/10.1080/15205436.2020.1811346

Anghelcev, G., Sar, S., Martin, J., & Moultrie, J. L. (2022). Is heavy binge-watching a socially driven behaviour? Exploring differences between heavy, regular, and non-binge-watchers. *Journal of Digital Media Management*, *13*, 201–221. https://doi.org/10.1386/jdmp_00035_1

Billaux, P., Billieux, J., Baggio, S., Maurage, P., & Flayelle, M. (2023). Thinking beyond cut-off scores in the assessment of potentially addictive behaviors: A brief illustration in the context of binge-watching. *Journal of Behavioral Addictions*, *12*, 303–308. https://doi.org/10.1556/2006.2023.00032

Billaux, P., Billieux, J., Gärtner, L., Maurage, P., & Flayelle, M. (2022). Negative affect and problematic binge-watching: The mediating role of unconstructive ruminative thinking style. *Psychologica Belgica*, *62*, 272–285. https://doi.org/10.5334/pb.1163

Billieux, J., Flayelle, M., & King, D. (2022). Addiction: expand diagnostic borders with care. *Nature*, *611*, 665. https://doi.org/10.1038/d41586-022-03760-y

Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, *4*, 119–123. https://doi.org/10.1556/2006.4.2015.009

Boursier, V., Musetti, A., Gioia, F., Flayelle, M., Billieux, J., & Schimmenti, A. (2021). Is watching TV series an adaptive coping strategy during the COVID-19 pandemic? Insights from an Italian community sample. *Frontiers in Psychiatry*, *12*, Article 599859. https://doi.org/10.3389/fpsyt.2021.599859

Brookes, S., & Ellithorpe, M. (2017). *Good for your mood, bad for your health: Narrative involvement, health behaviors, and binge watching* [Paper presentation]. The 67th ICA Annual Conference, San Diego, CA, United States.

Castro, D., Rigby, J. M., Cabral, D., & Nisi, V. (2021). The binge-watcher's journey: Investigating motivations, contexts, and affective states surrounding Netflix viewing. *Convergence*, *27*, 3–20. https://doi.org/10.1177/1354856519890856

Chang, Y. J., & Peng, C. Y. (2022). Exploring experiences of binge-watching and perceived addictiveness among binge-watchers: A qualitative study. *BMC Public Health*, *22*, Article 2285. https://doi.org/10.1186/s12889-022-14789-z

Chaudhary, A., Saroha, J., Monteiro, K., Forbes, A. G., & Parnami, A. (2022). "Are you still watching?": Exploring unintended user behaviors and dark patterns on video streaming platforms. In *DIS'22: Proceedings of the 2022 ACM Designing Interactive Systems Conference* (pp. 776–791). Association for Computing Machinery. https://doi.org/10.1145/3532106.3533562

Dieterich, R., Wüllhorst, V., Berghäuser, J., Overmeyer, R., & Endrass, T. (2021). Electrocortical correlates of impaired motor inhibition and outcome processing are related in high binge-watching. *Psychophysiology*, *58*, Article e13814. https://doi.org/10.1111/psyp.13814

Elkholy, H., Tawfik, F., Yosef, M., Billieux, J., & Flayelle, M. (2024). Mental health and binge-watching behavior among university students in Egypt. *Middle East Current Psychi-*

atry, *31*, 77. https://doi.org/10.1186/s43045-024-00467-w

Erdmann, E., & Dienlin, T. (2022). Binge-watching, self-determination, and well-being: A partially successful direct replication and extension of Granow et al. (2018). *Journal of Media Psychology*, *34*, 383–394. https://doi.org/10.1027/1864-1105/a000334

Erickson, S.E., Dal Cin, S., & Byl, H. (2019). An experimental examination of binge watching and narrative engagement. *Social Sciences*, *8*, 1–9. https://doi.org/10.3390/socsci8010019

Exelmans, L., & Van den Bulck, J. (2017). Binge viewing, sleep, and the role of pre-sleep arousal. *Journal of Clinical Sleep Medicine, 13*, 1001–1008. https://doi.org/10.5664/jcsm.6704

Flayelle, M., Brevers, D., King, D., Maurage, P., Perales, J.-C., & Billieux, J. (2023). A taxonomy of technology design features that promote potentially addictive online behaviours. *Nature Reviews Psychology*, *2*, 136–150. https://doi.org/10.1038/s44159-023-00153-4

Flayelle, M., Elhai J.D., Maurage, P., Vögele, C., Brevers, D., Baggio, S., & Billieux, J. (2022a). Identifying the psychological processes delineating non-harmful from problematic binge-watching: A machine learning analytical approach. *Telematics and Informatics*, *74*, Article 101880. https://doi.org/10.1016/j.tele.2022.101880

Flayelle, M., Maurage, P., & Billieux, J. (2017). Toward a qualitative understanding of binge-watching behaviors: A focus group approach. *Journal of Behavioral Addictions*, *6*, 457–471. https://doi.org/10.1556/2006.6.2017.060

Flayelle, M., Maurage, P., Karila, L., Vögele, C., & Billieux, J. (2019b). Overcoming the unitary exploration of binge-watching: A cluster analytical approach. *Journal of Behavioral Addictions*, *8*, 586-602. https://doi.org/10.1556/2006.8.2019.53

Flayelle, M., Maurage, P., Ridell Di Lorenzo, K., Vögele, C., Gainsbury, S.M., & Billieux, J. (2020). Binge-watching: What do we know so far? A first systematic review of the evidence. *Current Addiction Reports, 7*, 44–60. https://doi.org/10.1007/s40429-020-00299-8

Flayelle, M., Maurage, P., Vögele, C., Karila, L., & Billieux, J. (2019a). Time for a plot twist: Beyond confirmatory approaches to binge-watching research. *Psychology of Popular Media Culture*, *8*, 308–318. https://doi.org/10.1037/ppm0000187

Flayelle, M., Schimmenti, A., Starcevic, V., & Billieux, J. (2022b). The pitfalls of recycling substance-use disorder criteria to diagnose behavioral addictions. In N. Heather, M. Field, A. Moss, & S. Satel (Eds.), *Evaluating the brain disease model of addiction* (pp. 339–349). Routledge. https://doi.org/10.4324/9781003032762-34

Flayelle, M., Sigre-Leirós, V., Ferrecchia, L., Gainsbury, S. M., & Billieux, J. (2026). How does on demand streaming technology promote binge-watching? An exploration and classification of streaming platform design features. *Psychology of Popular Media*, 15, 62–71. https://dx.doi.org/10.1037/ppm0000579

Forte, G., Favieri, F., Tambelli, R., & Casagrande, M. (2023). To binge-watch TV series: How a leisure activity may affect sleep, mood, and quality of life. *Psychology Research and Behavior Management*, *16*, 2395–2405. https://doi.org/10.2147/PRBM.S407854

Forte, G., Favieri, F., Tedeschi, D., & Casagrande, M. (2021). Binge-watching: Development and validation of the binge-watching addiction questionnaire. *Behavioral Sciences*, *11*, Article 27. https://doi.org/10.3390/bs11020027

Gadino, N., Ellithorpe, M. E., Ulusoy, E., Wirz, D. S., & Eden, A. (2024). Binge-watching to feel better: Mental health gratifications sought and obtained through binge-watching. *Psychology of Popular Media*, *13*, 407–415. https://doi.org/10.1037/ppm0000485

Giardina, A., Schimmenti, A., Starcevic, V., King, D. L., Di Blasi, M., & Billieux, J. (2024). Problematic gaming, social withdrawal, and escapism: The Compensatory-Dissociative Online Gaming (C-DOG) model. *Computers in Human Behavior, 155,* 108187. https://doi.org/10.1016/j.chb.2024.108187

Gitnux Report. (2024). *Eye-opening binge-watching statistics: The habits impact revealed in numbers.* https://gitnux.org/binge-watching-statistics/

Granow, V., Reinecke, L., & Ziegele, M. (2018). Binge-watching and psychological well-being: Media use between lack of control and perceived autonomy. *Communication Research Reports*, *35*, 392–401. https://doi.org/10.1080/08824096.2018.1525347

Hamza, M., Halayem, S., Jraidi, I., Boudali, M., Bouden, A., & Belhadj, A. (2023). Is binge watching among medical students associated with depression and anxiety? *Insights in Depression and Anxiety*, *7*, 4–10. https://doi.org/10.29328/journal.ida.1001035

Ilyas, U., Maqsood, R., Ahsan, H., Rauf, A., & Afzal, S. (2023). Binge-watching as behavioral addiction: A systematic review. *Applied Psychology Review*, *2*, 39-65. https://doi.org/10.32350/apr.22.03

James, R. J. E., & Tunney, R. J. (2017). The need for a behavioural analysis of behavioural addictions. *Clinical Psychology Review*, *52*, 69–76. https://doi.org/10.1016/j.cpr.2016.11.010

Kardefelt-Winther, D. (2014). A conceptual and methodological critique of Internet addiction research: Towards a model of compensatory Internet use. *Computers in Human Behavior*, *31*, 351–354. https://doi.org/10.1016/j.chb.2013.10.059

Kardefelt-Winther, D., Heeren, A., Schimmenti, A., van Rooij, A., Maurage, P., Carras, M., Edman, J., Blaszczynski, A., Khazaal, Y., & Billieux, J. (2017). How can we conceptualize behavioural addiction without pathologizing common behaviors? *Addiction*, *112*, 1709–1715. https://doi.org/10.1111/add.13763

Katz, E., Blumler, J. G., & Gurevitch, M. (1973). Uses and gratifications research. *Public Opinion Quarterly*, *37*, 509–523. https://doi.org/10.1086/268109

Kubota, Y., Cushman, M., Zakai, N., Rosamond, W. D., & Folsom, A. R. (2018). TV viewing and incident venous thromboembolism: The atherosclerotic risk in communities study. *Journal of Thrombosis and Thrombolysis, 45*, 353–359. https://doi.org/10.1007/s11239-018- 1620-7

Kuppusamy, E., Ganasegaran, K., & Ganaprakasam, C. (2023). The prevalence of binge-watching behavior and its association with perceived stress among adolescents during the Covid-19 lockdown: An investigation. *Muallim Journal of Social Sciences and Humanities*, *7*, 131–140. https://doi.org/10.33306/mjssh/248

Lades, L. K., Barbett, L., Daly, M., & Dombrowski, S. U. (2022). Self-control, goal interference, and the binge-watching experience: An event reconstruction study. *Computers in Human Behavior Reports*, *7*, Article 100220. https://doi.org/10.1016/j.chbr.2022.100220

Martínez-Serrano, E., Gavilan, D., & Martínez-Navarro, G. (2023). Let's talk series: Binge-watching vs. marathon. The duality in the consumption of episodes from the grounded theory. *Comunicar*, *31*, 77–90. https://doi.org/10.3916/C75-2023-06

Mento, C., Lombardo, C., Cannizzaro, G., Imbesi, M., Arena, F., Scaramuzzino, C., Mustica, P., Muscatello, M. R. A., & Bruno, A. (2024). The role of affective temperaments in binge-watching addiction. *Journal of Affective Disorders Reports*, *16*, Article 100731. https://doi.org/10.1016/j.jadr.2024.100731

Merrill, K., & Rubenking, B. (2019). Go long or go often: Influences on binge-watching frequency and duration among college students. *Social Sciences*, *8*, Article 10. https://doi.org/10.3390/socsci8010010

Mowen, T. J., & Heitkamp, A. (2021). The anxiety of the pandemic: Binge-watching, splurging, sexting, hooking up, and masturbating among college students. *Deviant Behavior*, *43*, 1366–1384. https://doi.org/10.1080/01639625.2021.1982658.

Nanda, A. P., & Banerjee, R. (2020). Binge watching: An exploration of the role of technology. *Psychology & Marketing*, *37*, 1212–1230. https://doi.org/10.1002/mar.21353

Ort, A., Wirz, D.S., & Fahr, A. (2021). Is binge-watching addictive? Effects of motives for TV series use on the relationship between excessive media consumption and problematic viewing habits. *Addictive Behaviors Reports*, *13*, Article 100325. https://doi.org/10.1016/j.abrep.2020.100325

Panda, S., & Pandey, S.C. (2017). Binge-watching and college students: Motivations and

outcomes. *Young Consumers*, *18*, 425–438. https://doi.org/10.1108/YC-07-2017-00707

Paschke, K., Napp, A. K., & Thomasius, R. (2022). Applying ICD-11 criteria of gaming disorder to identify problematic video streaming in adolescents: Conceptualization of a new clinical phenomenon. *Journal of Behavioral Addictions*, *11*, 451–466. https://doi.org/10.1556/2006.2002.00041

Petriuc, R., & Drugas, M. (2024). When "the next episode" is too much? Watching TV series as a non-adaptive coping strategy. *Psychological Thought*, *17*, 247–270. https://doi.org/10.37708/psyct.v17i1.927

Pittman, M., & Sheehan, K. (2015). Sprinting a media marathon: Uses and gratifications of binge-watching television through Netflix. *First Monday*, *20*. https://doi.org/10.5210/fm.v20i10.6138

Pittman, M., & Steiner, E. (2021). Distinguishing feast-watching from cringe-watching: Planned, social, and attentive binge-watching predicts increased well-being and decreased regret. *Convergence*, *27*, 1507–1524. https://doi.org/10.1177/1354856521999183

Qayyoum, H., & Malik, Q. A. (2023). Gender differences in binge-watching by teenagers: A uses and gratification analysis. *Pertanika Journal of Social Sciences & Humanities*, *31*, 435–450. https://doi.org/10.47836/pjssh.31.1.23

Rangarajan, V., & Forman, A. (2019). Binge-watching leading to deep vein thrombosis and pulmonary embolism. *Annals of Clinical Case Reports*, *4*, Article 1734.

Richard, A., & Plante, C. N. (2024). Are you still watching? Antecedents and outcomes of binge-watching. *Psychology of Popular Media*, 13, 560-570. https://doi.org/10.1037/ppm0000487

Riddle, K., Peebles, A., Davis, C., Xu, F., & Schroeder, E. (2018). The addictive potential of television binge watching: Comparing intentional and unintentional binges. *Psychology of Popular Media Culture*, *7*, 589–604. https://doi.org/10.1037/ppm0000167

Rosli, N. S. F., & Mohd Mahudin, N. D. (2024). One more episode won't hurt! How stress, social interaction anxiety, and loneliness relate to binge-watching behaviours among university students. *Journal of Communication, Language and Culture*, *4*, 1–20. https://doi.org/10.33093/jclc.2024.4.1.1

Rubenking, B., & Bracken, C. C. (2021). Binge watching and serial viewing: Comparing new media viewing habits in 2015 and 2020. *Addictive Behaviors Reports*, *14*, Article 100356. https://doi.org/10.1016/j.abrep.2021.100356

Rubenking, B., Bracken, C.C., Sandoval, J. & Rister, A. (2018). Defining new viewing behaviours: What makes and motivates TV binge-watching? *International Journal of Digital Television*, *9*, 69–85. https://doi.org/10.1386/jdtv.9.1.69_1

Rubin, A. M. (2009). Uses-and-gratifications perspective on media effects. In J. Bryant & M. B. Oliver (Eds.), *Media effects: Advances in theory and research* (pp. 165–184). Routledge.

Schaffner, B., Stefanescu, A., Campili, O., & Chetty, M. (2023). Don't let Netflix drive the bus: User's sense of agency over time and content choice on Netflix. In *Proceedings of the ACM on Human-Computer Interaction*, *7*, Article 128, 1–32. https://doi.org/10.1145/3579604

Schimmenti, A. (2023). Beyond addiction: Rethinking problematic internet use from a motivational framework. *Clinical Neuropsychiatry*, *20*, 471–478. https://doi.org/10.36131/cnfioritieditore20230601

Shim, H., & Kim, K. J. (2018). An exploration of the motivations for binge-watching and the role of individual differences. *Computers in Human Behavior*, *82*, 94–100. https://doi.org/10.1016/j.chb.2017.12.032

Sigre-Leirós, V., Billieux, J., Maurage, P., King, D.L., Schimmenti, A., Mohr, C., & Flayelle, M. (2023). Binge-watching behaviors in times of COVID-19: A longitudinal examination of changes in affect and TV series consumption patterns during lockdown. *Psychology of Popular Media*, *12*, 173–185. https://doi.org/10.1037/ppm0000390

Starosta, J., & Izydorczyk, B. (2020). Understanding the phenomenon of binge-watching: A systematic review. *International Journal of Environmental Research and Public Health*, *17*, 44–69. https://doi.org/10.3390/ijerph17124469

Starosta, J., Izydorczyk, B., & Lizińczyk, S. (2019). Characteristics of people's binge-watching behavior in the "entering into early adulthood" period of life. *Health Psychology Report*, *7*, 149–164. https://doi.org/10.5114/hpr.2019.83025

Starosta, J., Izydorczyk, B., & Wontorczyk, A. (2021). Anxiety-depressive syndrome and binge-watching among young adults. *Frontiers in Psychology*, *12*, Article 689944. https://doi.org/10.3389/fpsyg.2021.689944

Statista (2024). *Video streaming (SVoD) – worldwide*. https://www.statista.com/outlook/dmo/digital-media/video-on-demand/video-streaming-svod/worldwide

Steins-Loeber, S., Reiter, T., Averbeck, H., Harbarth, L., & Brand, M. (2020). Binge-watching behaviour: The role of impulsivity and depressive symptoms. *European Addiction Research*, *26*, 141–150. https://doi.org/10.1159/000506307

Sun, J. J., & Chang, Y. J. (2021). Associations of problematic binge-watching with depression, social interaction anxiety, and loneliness. *International Journal of Environmental Research and Public Health*, *18*, Article 1168. https://doi.org/10.3390/ijerph18031168

Tolba, A.A., & Zoghaib, S.Z. (2022). Understanding the binge-watching phenomenon on Netflix and its association with depression and loneliness in Egyptian adults. *Media Watch*, *13*, 264–279. https://doi.org/10.1177/09760911221117339

Tukachinsky, R., & Eyal, K. (2018). The psychology of marathon television viewing: Antecedents and viewer involvement. *Mass Communication and Society*, *21*, 275–295. https://doi.org/10.1080/15205436.2017.1422765

Vaterlaus, M., Spruance, L. A., Frantz, K., & Kruger, J. S. (2019). College student television binge-watching: Conceptualization, gratifications, and perceived consequences. *The Social Science Journal*, *56*, 470–479. https://doi.org/10.1016/j.soscij.2018.10.004

Wingralek, Z. J., Banaszek, A., Giermasiński, A., Czarnecki, A., Goliszek, K., Kajka, N., Juchnowicz, D., Kohn, P. M., & Karakuła-Juchnowicz, H. (2024). Turn on the screen, turn off the loneliness—Analysis of risk factors for binge-watching among Polish medical and non-medical students: A web-based cross-sectional study. *Annals of Agricultural and Environmental Medicine*, *31*, 264–271. https://doi.org/10.26444/aaem/183779

Wirz, D. S., Möri, M., Ort, A., Cordeiro, J. A., Castro, D., & Fahr, A. (2023). The more you watch, the more you get? Re-examining the effects of binge-watching on entertainment experiences. *Journal of Media Psychology*, *35*, 99–108. https://doi.org/10.1027/1864-1105/a000355

Yu, H., & Alizadeh, F. (2024). Online binge-watching among Chinese college students: Implications for loneliness, anxiety, and depression. *Psychology Research and Behavior Management*, *17*, 295–303. https://doi.org/10.2147/PRBM.S447311

23

AN OVERVIEW OF CELEBRITY WORSHIP FROM THE PERSPECTIVE OF ADDICTIONS

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ABSTRACT:

This chapter provides a comprehensive review of celebrity worship with a specific emphasis on its addictive features. Celebrity worship, defined as an obsessive fascination with a famous person, has been linked to mental health issues such as depression, anxiety, dissociation, and body image concerns. Celebrity admiration can be viewed as a continuum ranging from healthy fascination to excessive obsession. According to the Absorption-Addiction Model, three dimensions of celebrity worship can be distinguished: entertainment-social, intense-personal, and borderline-pathological. The latter two dimensions, which involve compulsive and obsessive affective and behavioral manifestations of celebrity admiration, showed stronger associations with mental health problems in the literature. By contrast, celebrity admiration for entertainment-social purposes was associated mostly with mild mental health difficulties in some studies. These dimensions are assessed by the commonly used measurement tool for celebrity worship, the Celebrity Attitude Scale (CAS). The CAS, with its three dimensions reflecting the Absorption-Addiction Model, also provides a comprehensive assessment of the extent of global celebrity worship. The prevalence of celebrity worship is also discussed in this chapter, with varying estimates from different study populations. Regarding the demographics, studies on gender differences showed inconsistent findings in the literature. The relationship between age and celebrity worship indicates higher levels among younger individuals, though findings vary across studies.

The chapter also delves into the predictors of worship of this group of persons and its co-occurrence with addiction-related problems. Research suggests a positive association between celebrity worship and various behaviors on the compulsive-addictive spectrum, such as obsessive-compulsive tendencies, gambling disorder, problematic Internet, social media, and specifically, Instagram use, and compulsive buying. Excessive celebrity admirers are more likely to encounter severe excesses, including substance use, and self-harming, such as intentional self-injury and suicide attempts, which are often observed in relation to behavioral addictions. Moreover, impulsivity was associated with both celebrity worship and addictions. Therefore, evidence suggests that the two phenomena may share some similarities in their underlying mechanisms in aspects of compulsivity, impulsivity, and loss of control. In conclusion, this book chapter provides a comprehensive overview of celebrity worship, emphasizing its addictive aspects and shedding light on the parasocial relationship between fans and celebrities. Based on the literature, further research is needed to deepen our understanding of the psychological mechanisms underlying celebrity worship and its implications for mental health.

KEYWORDS:

behavioral addictions, celebrity worship, comorbidity, impulsivity, parasocial relationship

1. DEFINITION AND CONCEPTUAL FRAMING OF CELEBRITY WORSHIP IN THE PARASOCIAL PHENOMENA

In the 21st century, we live in a world of celebrities, influencers, and social media stars, who, as Brown (2015) emphasized, can become powerful agents of societal processes. Later in this chapter, it will be elaborated on how celebrities can influence many aspects of our lives, but first, there is a need to understand the underlying phenomenon that drives people who identify themselves as fans. People can develop parasocial feelings, which are defined as one-way social-emotional relationships toward celebrities (Horton & Wohl, 1956). Drawing on the theoretical foundation of parasocial relationships, McCutcheon, Maltby, et al. (2004) introduced the definition of *celebrity worship* in the early 2000s as *an excessive interest in the life of a famous person* (McCutcheon, Maltby, et al., 2004). Brown (2015) described celebrity worship as the process of expressing devotion, commitment, and love to a media figure, characterized by intense devotion, strong loyalty, and a willingness to dedicate time, money, and personal freedom to admire the celebrity. According to Sansone and Sansone (2014), celebrity worship can be viewed as a spectrum ranging from benign enthusiasm to problematic behaviors such as compulsive imitation.

1.1 Theoretical background

The Absorption-Addiction Model explains celebrity worship. This model suggests a hierarchical structure that can be converted to three different dimensions, following the aforementioned continuum from healthy to excessive celebrity admiration (McCutcheon et al., 2002). The first dimension, termed the *entertainment-social dimension*, refers to feelings, thoughts, and actions that indicate healthy enthusiasm. It includes behaviors such as talking to people who are also fans of their favorite popular celebrity or having fun reading news about the celebrity. The second, *intense-personal dimension* includes more intense, compulsive behaviors, which may indicate a problem. This dimension

contains behaviors and intense parasocial feelings (e.g., the fan considers the celebrity as a soulmate, or when something good happens to their favorite celebrity, it feels as if it is happening to them). In the third, *borderline-pathological dimension*, excessive behaviors appear (e.g., the fan feels compelled to learn the personal habits and preferences of the admired celebrity, or the fan would buy the celebrity's personal possessions (e.g., a napkin) for thousands of dollars. However, these behaviors become particularly dysfunctional when they result in negative consequences, such as substantial financial loss or inability to afford basic necessities. As Griffiths (2024) pointed out, if a fan has a low-paying job and overspends to follow a favorite celebrity on tour or purchase merchandise, this fan may encounter substantial financial difficulties due to insufficient income to support such pursuits. The borderline-pathological celebrity worship involves a perceived lack of agency and a belief in the benevolent omnipotence of the admired celebrity (North et al., 2007). The Absorption-Addiction Model (McCutcheon et al., 2002) postulates that individuals with a weaker, less complex personality structure are more likely to exhibit higher celebrity admiration in an attempt to make their personality structure more integrated and solid by identifying with their favorite celebrity (i.e., absorption). Addiction occurs when the fan develops a tolerance for excesses related to their parasocial involvement (e.g., identifying with the actual feelings of the celebrity) so that they have to internalize increasingly extreme behaviors (e.g., imitation) to experience the same deep emotional engagement in the process of identification and absorption with their favorite celebrity as before. Supporting the Absorption-Addiction Model, a recent study by Aruguete et al. (2024) found that extremism (Kruglanski et al., 2021) and obsessive passion (Vallerand et al., 2003) were positively associated with higher celebrity admiration levels.

1.2 Measurement

The most commonly used measurement tool for celebrity worship is the *Celebrity Attitude Scale* (CAS; Maltby et al., 2005; McCutcheon et al., 2002, 2004), which is based on the aforementioned theory and dimensions. The scale is used to assess the level of celebrity admiration that an individual feels towards their favorite celebrity. For each statement on the Celebrity Attitude Scale, participants answer on a 1 to 5 Likert-scale, ranging from (1) *strongly disagree* to (5) *strongly agree*. A higher score on the CAS indicates a higher level of celebrity worship (McCutcheon, Aruguete, et al., 2004).

The first dimension is the entertainment-social factor (ES), containing ten items such as "*Learning the life story of my favorite celebrity is a lot of fun*". The second dimension is the intense-personal factor (IP), to which the following example can be linked "*I consider my favorite celebrity to be my soul mate*", indicating that the emotional involvement with the celebrity is excessive. The third level is the borderline-pathological factor (BP), in which a sample item states *"If I were lucky enough to meet my favorite celebrity, and he/she asked me to do something illegal as a favor, I would probably do it*". At the highest levels, empathy with the celebrity's successes and failures, over-identification with the celebrity, compulsive behavior, and obsession with the details of the celebrity's life are exhibited.

Several studies (e.g., Greenwood et al., 2018; Sansone & Sansone, 2014) estimated a global celebrity worship score by summarizing the items following the instruction by McCutcheon et al. (2002) who interpreted the total score of the CAS as a global indicator of fan engagement. Recently, a brief version of the CAS, the CAS-7 was developed and validated by Zsila et al. (2024), which comprises two factors: the Entertainment-Social factor (3 items) and the "Intense-Pathological" (IPBP) factor, which combines the IP and BP factors (4 items; see Appendix for the CAS-7 scale). Decades of empirical findings suggest that the two problematic dimensions of the CAS (i.e., Intense-Personal and Borderline-Pathological) share convergent associations with mental health indicators (see Brooks, 2021). Other assessment instruments are also available to measure the depth of emotional involvement with celebrities (e.g., the Public Figure Preoccupation Inventory [Sheridan et al., 2006], the Idol Worship Questionnaire [Yue & Cheung, 2000], the Expression of Idolization Scale [Raviv et al., 1996], the Parasocial Interaction Scale [Rubin et al., 1985], the Celebrity-Persona Parasocial Interaction Scale [Bocarnea, 2007], or the Celebrity Appeal Questionnaire [Stever, 1991]), but the CAS has been applied in more than 100 studies to date, proving to be the most commonly used assessment instrument to measure celebrity admiration (Locker et al., 2023).

1.3 Understanding Devotion: Fans, Worshipers, and Their Motivations

According to McCutcheon et al. (2002), the Celebrity Attitude Scale was developed to *distinguish between celebrity worshipers and those showing healthy enthusiasm towards famous persons*. Even though the word "fan" originates as an abbreviation for fanatic, a term describing extreme enthusiasm (Leets et al., 1995), Stever (2011a) criticizes the lack of clear distinction between fans and celebrity worshipers, proposing that not all fans are celebrity worshipers. Stever (2011a) argued that most fans do not engage in behaviors of the borderline-pathological side of the continuum but rather transform their admiration into creative activities in the fan community (i.e., fandom).

Another perspective on the phenomenon by Sandvoss (2005) considers fandom as a form of narcissistic self-reflection, suggesting that fans become fascinated by extensions of themselves embodied in their objects of obsession. Sandvoss (2005) argues that fans project their own values and identities onto their objects of admiration, forming intense personal bonds. This identification extends to the point where the object of admiration becomes a significant part of the fan's self-concept. This idea aligns with Self-Expansion Theory (Aron et al., 1991), which posits that significant others such as objects of admiration in this specific case, become integral parts of one's self-concept. This perspective explains why fans may find it difficult to cope with perceived betrayals or failures of their objects of admiration, as such experiences can threaten their self-identity.

On the other hand, Hollander (2010) suggests that the motivations for celebrity worship are rooted in the desire to identify with individuals who possess attributes that the worshippers perceive as lacking in their own lives. This perspective posits that insecurity about social status and uncertainty about what qualities are worthy of admiration

drive individuals towards celebrity worship, as they seek intense experiences in their social lives to compensate for social isolation. Supporting this view, a content analysis of fan mail conducted by He and Feng (2002) revealed that young fans often express a desire to achieve similar goals or possess similar qualities. This effort suggests that celebrities serve as influential role models for young people, providing a blueprint for aspirations and self-improvement.

The main difference between the two perspectives is that while according to Sandvoss (2005), fans use the celebrity to extend and affirm their own identities, projecting their own qualities and preferences onto the celebrity, Hollander (2010) suggests that fans admire celebrities as role models who possess desirable attributes that the fans themselves lack and wish to attain. This latter approach aligns with the theoretical foundation of the Absorption-Addiction Model (McCutcheon et al., 2002). Therefore, there may be a need to further distinguish between problematic worshipers and devoted fans without mental problems.

Another terminology worth mentioning is a "follower" based on Tulloch and Jenkins (1995). Jenkins (2006) proposes that "*One becomes a "fan" not by being a regular viewer of a particular program but by translating that viewing into some kind of cultural activity, by sharing feelings and thoughts about the program content with friends, by joining a "community" of other fans who share common interests*" (Jenkins, 2006, pp. 41).

1.4 The Parasocial Phenomena

The interaction between a celebrity and a fan was first termed a pseudosocial interaction, as it was limited to the relationship when the fan sees the celebrity in commercials appearing on TV, which is more like an imaginary social relationship (Alperstein, 1991). According to Alperstein (1991), these relationships can extend beyond imaginary interactions, significantly impacting fans' perceptions and behaviors. The object-relations theory proposes that fans may relate to celebrities to further develop their personal sense of self and their relationships with others, and as Flanagan (2008) pointed out, these relationships do not need to be "real".

The concept of celebrity worship was also developed based on early concepts of parasocial interaction, a term suggested by Horton and Wohl (1956), describing the one-sided relationships fans form with celebrities, in which fans feel a sense of closeness and intimacy despite the lack of reciprocal communication. These relationships have a special importance for the fans and are often integral parts of their identities and emotional lives (Hackley & Hackley, 2016). Giles (2002) defines parasocial interaction as a one-sided relationship with a person, often of higher status. The fan usually knows the detailed personal lives of these individuals, but they are unaware of the fan. This phenomenon is attributed to the Media Equation theory (Reeves & Nass, 1996), which suggests that people do not differentiate between real-world interactions and those experienced through the media. Many researchers view parasocial relationships as extensions of normal social interactions (Branch et al., 2013; Giles, 2002; Greenwood et al.,

2008) and consider them a typical part of identity and intimacy development (Greene & Adams-Price, 1990; Larson, 1995; Stever, 2011b). While these relationships are primarily one-sided, fans often seek real interaction and reciprocity from their favorite celebrities (Ferris, 2001; Roberts, 2007), expressing a desire for more intimacy. Yue and Cheung (2000) argued that parasocial interactions are part of normal personality development.

The advent of the Internet and social media has significantly transformed the nature of parasocial interactions, introducing a new dynamic to fan-celebrity relationships (Giles, 2017; Stever, 2011a), and allowing reciprocal interactions. Social media platforms enable more direct and immediate connections between celebrities and fans, allowing celebrities to share aspects of their personal lives and interact with fans in real-time (Marwick & Boyd, 2011; Stever & Lawson, 2013). This shift from mass media to more interactive, personalized media has created opportunities for more genuine fan-celebrity interactions, reducing the gap between the public and the private self of the celebrity (Stever, 2009; Toffler, 2022). This increased accessibility can lead fans to view celebrities as part of their social network, though this dependency is sometimes associated with poorer interpersonal trust (Baek et al., 2013). Despite some potential risks (e.g., developing excessive celebrity worship), parasocial interactions can be beneficial, particularly for individuals with low self-esteem or social difficulties, offering a safe space free from the fear of social rejection (Derrick et al., 2008).

1.5 From Passion to Obsession: The Role of Desire for Fame and Identification in Celebrity Worship

Regarding similar conceptual frameworks, there is a need to clarify the differences and similarities between passion and celebrity worship. Passion is a strong positive feeling towards an object, activity, or person that one cherishes and integrates into one's identity (Vallerand et al., 2003). The Dualistic Model of Passion identifies two types of passion: obsessive and harmonious passion. Obsessive passion involves an uncontrollable urge to engage with the object of passion, sometimes leading to negative consequences such as addiction (Vallerand, 2012). By contrast, harmonious passion is a healthy engagement with the object of passion, which is in harmony with other life aspects, often resulting in positive outcomes such as psychological well-being. The Absorption-Addiction Model of celebrity worship aligns with the concept of obsessive passion based on Aruguete et al. (2024) as an intense absorption with the personal lives of celebrities can interfere with daily life, which is a core feature of behavioral addictions such as compulsive buying and problematic Internet use. Therefore, individuals prone to obsessive passion may be more likely to exhibit excessive celebrity admiration.

Celebrity worship is also closely associated with the desire for fame and wishful identification. Zsila et al. (2018) found a positive relationship between celebrity worship desire for fame, suggesting that individuals who are fascinated by the glamorous lifestyles of celebrities and wish to be admired by others are more likely to engage in celebrity worship. Similar associations have been found in relation to young adults, indicating

that those who intensely admire celebrities often have a strong desire to become famous (Greenwood et al., 2018; Reeves et al., 2012).

In addition to a desire for fame, wishful identification was associated with celebrity worship. Wishful identification refers to the desire to become like a favorite fictional character or real-life media figure (Hoffner & Buchanan, 2005). This psychological process can lead individuals to adopt behaviors and attitudes similar to those of their admired celebrities, further fueling their celebrity worship. This identification with celebrities highlights the aspirational aspects of celebrity admiration.

1.6 Prevalence of celebrity worship

According to Stever (2011a), there is a need to distinguish between excessive celebrity worship and dedicated, passionate fan enthusiasm without associated mental health problems. Theoretical midpoints were used to estimate the prevalence of celebrity worship in early studies (Maltby et al., 2003; Maltby & Day, 2011; Stever, 2011a), which have been criticized for its lack of psychometric accuracy (Stever, 2011a). Zsila et al. (2024) recently addressed this gap by providing a cut-off point using a representative sample of Hungarian adults.

To determine the cut-off score for high-level celebrity worship, Zsila et al. (2024), used Latent Profile Analysis (LPA). This statistical method identified four distinct classes of celebrity admiration based on the CAS-7 scale, ranging from low to high levels. The fourth class, representing individuals with high scores on all items, served as the "gold standard" for further calculations. Using the cut-off score of 26, high-level celebrity admiration was identified with high accuracy (97.7%), as demonstrated by sensitivity, specificity, and predictive values.

Based on the findings, 4.53% of Hungarian adults exhibited high-level celebrity admiration (i.e., "celebrity worshipers") which could be associated with a higher risk for experiencing mental health problems such as an elevated risk for Internet-based addictive behaviors. The prevalence among young adults aged 18–34 years was notably higher (8.51%).

These prevalence rates align with findings from recent meta-analyses on behavioral addictions, highlighting comparable rates globally. For instance, a meta-analysis on gaming disorder reported a prevalence of 6.7% (Zhou et al., 2024), but for younger populations it was 9.9% (Gao et al., 2022). Similarly, problematic social media use demonstrated high global prevalence, with a meta-analysis spanning 32 countries or regions indicating an overall prevalence rate of 24% (Cheng et al., 2021). These findings are consistent with earlier studies on Internet addiction in a representative Hungarian sample, which reported similar prevalence rates, 11% for adults and 18% for adolescent users (Koronczai et al., 2011).

Furthermore, it is important to consider the limitations of survey-based prevalence studies, as noted by Maraz et al. (2015). Prevalence estimates based on cut-off scores may risk overpathologizing everyday behaviors, especially if they fail to consider contextual

factors, such as cultural norms, individual circumstances, and the broader social environment that shape these behaviors. Billieux et al. (2023) emphasized the need to move beyond rigid cut-off scores when assessing potentially addictive behaviors, such as binge-watching, arguing that such thresholds may oversimplify complex behaviors and lead to overgeneralization. Their approach highlights the importance of considering the interplay of individual differences, environmental contexts, and psychological motivations in understanding problematic behaviors such as celebrity worship.

2. THE ASSOCIATION OF CELEBRITY WORSHIP WITH ADDICTIONS

2.1 The biopsychosocial model

Addiction is viewed as part of a biopsychosocial process, an interaction between biological predisposing factors, psychological characteristics (e.g., personality and motivations), and social environment (Griffiths, 2005). Therefore, the Biopsychosocial Model can provide a comprehensive framework to understand the multifaceted nature of other compulsive behaviors with addiction-like features such as celebrity worship. Biological aspects may involve genetic predisposing factors or neurobiological mechanisms influencing the intensity of celebrity worship (e.g., impulsivity; McCutcheon et al., 2002). Psychological factors such as personality traits, self-esteem, and identity formation can also significantly influence one's propensity to engage in celebrity worship. For instance, individuals with lower self-esteem might turn to celebrities to identify with their desirable characteristics (Brooks, 2021). Social factors such as cultural norms, media influence, and peer interactions can shape and reinforce admiration, creating a fertile ground for celebrity worship. By integrating these dimensions, the bio-psycho-social model can provide a holistic perspective on the complexities of celebrity worship.

2.2 Psychoactive substance use and celebrity worship

Research found associations between celebrity worship and excessive psychoactive substance use, suggesting a potential link between excessive admiration of celebrities and substance abuse behaviors. While the overall contribution of celebrity worship to psychoactive substance use problems was found to be limited, previous studies have suggested that extensive media attention to famous stars' personal problems, such as alcohol and drug use or self-harming behaviors, may increase the likelihood of engagement in similar health-risk behaviors among their fans (Purington & Whitlock, 2010; Shaw et al., 2010). In line with these studies, Zsila et al. (2020) found that high celebrity worship was associated with more frequent occurrences of drunkenness and illicit substance use among men, but the explanatory power of celebrity worship in these behaviors was limited, suggesting that these behaviors are largely independent of celebrity influence.

2.3 Celebrity worship and behavioral addictions

Research has shown a positive relationship between celebrity worship and behavioral addictions, including gambling addiction (Lian et al., 2019), compulsive buying (Reeves et al., 2012), problematic Internet (Zsila et al., 2018) and social media use (Zsila et al., 2021), and mobile phone dependence (Jia et al., 2023). Zsila et al. (2018) found a positive relationship between problematic Internet use and celebrity worship, whereas the amount of time spent online was not associated with celebrity worship. This pattern was also found in relation to problematic social media use and celebrity worship (Zsila et al., 2021). Individuals with intense-personal or borderline-pathological celebrity worship tendencies often exhibit compulsive behaviors in other life domains, seeking gratification, validation, or escape through addictive activities (Reeves et al., 2012). For instance, imitation of a glamorous lifestyle can lead to compulsive buying, gambling, and Internet addiction. The need for constant engagement with celebrity content, whether through social media or other platforms, can also foster Internet addiction as individuals may develop excessive emotional bonds following their idols, or being overly engaged with their content, sometimes to the detriment of their daily lives and responsibilities (McCutcheon, Maltby, et al., 2004). These studies suggest that celebrity worship may share similar underlying mechanisms as behavioral addictions, which can be further supported by the concurrent associations of these phenomena with poor mental health (e.g., symptoms of depression and anxiety) and significant impairments in daily functioning. These impairments can manifest as reduced academic or work performance, deteriorated social relationships, and poorer cognitive ability (Brailovskaiaet al., 2019; Grant et al., 2019; Lian et al., 2019; McCutcheon et al., 2014; Sansone & Sansone, 2014). Therefore, the connection between celebrity worship and behavioral addictions underscores the potential risks associated with excessive admiration of celebrities and its impact on individuals' mental health and everyday life.

With regard to the association of celebrity worship with compulsive buying-shopping behavior, there is a significant difference between impulsive and compulsive buying that warrants attention. Impulsive buying is characterized by spontaneous, emotionally driven purchases that often occur in response to situational cues and persuasive marketing strategies. By contrast, compulsive buying involves a chronic, compelling urge to buy possessions, which can lead to significant distress (Wan et al., 2024). Despite their differences, both impulsive (Chen et al., 2022) and compulsive buying (Reeves et al., 2012) behaviors were associated with celebrity worship. Fans who intensely follow celebrities may be more prone to impulsive purchases inspired by their idols' endorsements, while others may develop compulsive buying habits as a way to cope with emotional distress or to engage in the lifestyles of celebrities they admire. Additionally, celebrity endorsement or recommendation can encourage fans to buy a product and thus increase purchase intent (Chiou et al., 2005; Wang et al., 2013).

2.4 Personality traits and impulsivity

Over the past two decades, several studies have focused on identifying the personality traits of individuals who exhibit high levels of celebrity worship. Maltby et al. (2003, 2004) found that the entertainment-social dimension of celebrity worship was primarily associated with extraversion, the intense-personal dimension with neuroticism, and the borderline-pathological dimension with psychoticism. Subsequent research by Maltby et al. (2011) confirmed the positive relationship between entertainment-social worship and extraversion and the link between intense-personal worship and neuroticism. McCutcheon et al. (2016) found that among the Big Five personality dimensions, only conscientiousness showed a weak, negative relationship with the borderline-pathological dimension of celebrity worship. Conversely, Swami et al. (2011) reported negative associations between openness and celebrity worship. Additionally, they found that intense-personal worship was negatively related to agreeableness, conscientiousness, and emotional stability. Ashe et al. (2005) found that intense-personal celebrity worship was positively associated with narcissism. Greenwood et al. (2018) also found a positive association between vulnerable narcissism and celebrity worship.

McCutcheon et al. (2014) found that borderline-pathological celebrity worship was positively associated with impulsivity, sensation-seeking, and the lack of consideration for future consequences. These findings suggest that individuals with higher levels of celebrity worship may engage in more spontaneous and sometimes risky behaviors to feel closer to their favorite celebrities or follow their lifestyles. Aruguete et al. (2019) provided further empirical support for this association. Moreover, Chen et al. (2022) found that individuals with higher impulsivity levels are more prone to develop intense-personal or borderline-pathological forms of celebrity worship, which is characterized by obsessive thoughts and impulsive behaviors. These findings underscore the importance of considering individual differences in personality when examining the motivations and consequences of celebrity worship.

In a similar vein, Maltby and Day (2017) found that entertainment-social and intense-personal celebrity worship were positively associated with reward responsiveness.

Overall, the relationship between excessive celebrity worship and personality characteristics, particularly impulsivity and neuroticism, reveals complex interactions that influence the extent and nature of celebrity admiration. Understanding these connections can provide deeper insights into the psychological underpinnings of celebrity worship and its broader implications for individual behavior and mental health.

2.5 Compulsive behaviors and fantasy activity

Compulsive behaviors and fantasy activities are prevalent among individuals with high levels of celebrity worship, manifesting as obsessive thoughts, rituals, or fantasies centered around celebrities. These behaviors may serve as coping mechanisms, sources of comfort, or avenues for wish fulfillment for individuals deeply engaged in parasocial relationships with celebrities (McCutcheon et al., 2002).

Previous research has revealed a relationship between the intensity of celebrity worship and the propensity for fantasy engagement (e.g., Maltby et al., 2006; McCutcheon, Aruguete, et al., 2016). Maltby et al. (2006) found that individuals scoring higher on problematic dimensions of celebrity worship are more prone to immerse in fantasies and report dissociative experiences. Another study confirmed that higher levels of all dimensions of celebrity worship are positively associated with fantasizing (McCutcheon, Aruguete, et al., 2016). Furthermore, Sheridan et al. (2006) identified a positive relationship between dissociative experiences and celebrity worship, while subsequent research suggested a link between maladaptive daydreaming[1] and celebrity worship (Zsila et al., 2018). In another study by Zsila et al. (2019), maladaptive daydreaming mediated the relationship between celebrity worship and psychological distress, suggesting that individuals who engage extensively in fantasy activities may be more likely to develop an obsession with celebrities. These psychological constructs share considerable similarities. Specifically, previous studies have found that both are positively associated with fantasy proneness (Bigelsen et al., 2016; Maltby et al., 2006; McCutcheon, Gillen, et al., 2016) and can negatively impact educational and work performance, as well as interpersonal relationships (Maltby et al., 2003, 2004; Somer, 2002).

In summary, celebrity worship has been linked to excessive fantasy engagement, and dissociative experiences, indicating a rich fantasy activity among fans.

2.6 Potential clinical relevance of celebrity worship

The clinical investigation of celebrity worship remains an unexplored area of research, with a lack of case reports of individuals experiencing clinically significant functional impairment which can be associated with celebrity worship. "Celebrity Worship Syndrome" (CWS) is the concept describing obsessive and excessive admiration of celebrities (Swaminathan, 2020), which is characterized by maladaptive behaviors and functional impairment (Griffiths, 2024). However, CWS is not formally recognized as a clinical diagnosis and remains primarily a descriptive framework highlighting potential risks rather than a disorder.

The absence of clinical case studies in the literature may stem from recent efforts to define clear thresholds for the identification of individuals potentially at risk of celebrity worship which is clearly associated with psychological problems. Until Zsila et al.'s (2024) study, there was a lack of consensus on a cut-off point to identify problematic levels of celebrity admiration. This limitation has hindered the screening of individuals potentially at risk of problematic levels of celebrity admiration. Furthermore, it is plausible that individuals with problematic levels of celebrity worship tendencies are more likely to seek treatment for related issues (e.g., mood disorders, personality disorders, or behavioral addictions) rather than for celebrity worship itself.

1 Maladaptive daydreaming is defined as an "*extensive fantasy activity that replaces human interaction and/or interferes with academic, interpersonal or vocational functioning*" (Somer, 2002, p. 199).

In conclusion, while celebrity worship has been linked to subclinical distress and behavioral dysfunctions, its clinical relevance requires further exploration. Clinical investigations and the examination of high-risk populations could clarify whether celebrity worship functions as a primary psychopathological issue or as a co-occurring behavior with other underlying mental health conditions. Therefore, it is important to note that while the phenomenon of celebrity fanship may be widespread, documented cases of individuals seeking clinical treatment specifically for problematic levels of celebrity admiration are scarce, which can be attributed to the ongoing debate on the delineation of healthy and problematic levels of celebrity admiration.

2.7 Fan and fantasy activity

Fan and fantasy activities are vital elements of celebrity worship, which can encompass a broad range of behaviors from entertainment-social engagement to intense-personal attachment and borderline-pathological obsession. These activities include creating fan fiction, attending fan conventions, and following celebrities through media platforms (Gong & Huang, 2022). These activities not only reflect individuals' admiration and emotional investment in celebrities but also serve as outlets for self-expression, social connection, and emotional fulfillment within the fan communities. These activities provide a safe and controlled environment for fans to explore their own identities and emotions. While generally harmless and beneficial in fostering creativity and community, excessive involvement in these activities can blur the lines between reality and fantasy, potentially leading to unrealistic expectations and real-life social isolation (Sandvoss, 2005).

Research has shown that idol worship can negatively impact identity development. Cheung and Yue (2003) found that membership in fan clubs and prolonged periods of idol worship had significant negative effects on identity achievement. Similarly, Maltby et al. (2006) reported some evidence that higher levels of celebrity worship were negatively associated with ego identity. Reeves et al. (2012) found that fans with a strong emotional attachment to their favorite celebrity have a less integrated self-image.

On the other hand, the development of teenagers can be positively impacted by enthusiasm towards celebrities, particularly when their involvement remains at the entertainment-social level rather than escalating to intense-personal or borderline-pathological levels. This form of enthusiasm can alleviate life stress and enhance overall life satisfaction (Lin & Lin, 2007). The fan community, with its own rules and regulations, serves not only as an educational platform but also as a channel for social welfare. Many fans engage in charitable activities inspired by their idols (Bennett, 2014). Through participation in these fan activities, teenagers can acquire social skills, and find emotional support within the fan group (Maltby et al., 2001).

3. THE POSITIVE SIDE OF CELEBRITY ADMIRATION

As Ang and Chan's (2018) research revealed from fans' self-reports, a favorite celebrity can also be a source of aspiration. Fans in this study reported that their enthusiasm towards their favorite celebrity motivated them to learn a new language, explore a new culture, and overcome personal difficulties. Celebrities' successes also motivated fans to lead their own lives to a higher level of success. Bennett (2014) has shown in her research on Lady Gaga's fans that the singer can motivate her fans to take social responsibility. Taking this into account, and knowing the impact of celebrities' online presence (Chiou et al., 2005; Driessens, 2013; Wang et al., 2013), the promotion of mental health may be even more important. Lee (2019a, 2019b) found evidence that the media's concern for a celebrity's mental health can raise public awareness of certain mental illnesses. Franssen (2020) refers to the process of a celebrity publicizing their struggles with mental illness as a "celebritization of self-care". This may also encourage fans to seek professional help. Clement et al. (2013) also highlighted that celebrities' self-report experiences and self-narratives help reduce stigma due to the parasympathetic relationships with celebrities experiencing mental health problems.

4. SUMMARY

Celebrity worship refers to an intense admiration for a celebrity, often characterized by obsessive behaviors and emotional attachment. This phenomenon can have various psychological and social implications and has various connections.

Celebrity worship has been linked to higher levels of substance use. Fans deeply involved with celebrities may emulate their idols' behaviors, including substance use, which can lead to increased consumption of alcohol, tobacco, and drugs. This mimicry is often driven by the desire to feel closer to the celebrity or to adopt a lifestyle perceived as glamorous.

Intense celebrity worship is associated with various behavioral addictions, such as problematic Internet use, compulsive buying, and gambling. The Absorption-Addiction Model explains that fans may develop an addictive attachment to their idols, leading to excessive and often harmful behaviors. The need to constantly follow and engage with celebrity-related content can interfere with daily life and responsibilities.

Research shows that certain personality traits are more prevalent among those who worship celebrities. Traits such as neuroticism, extraversion, and lower levels of self-esteem are commonly found in intense celebrity worshipers. These individuals often seek validation and a sense of belonging through their admiration of celebrities, using their fandom to compensate for personal insecurities.

Celebrity worship is strongly connected to fantasy proneness and maladaptive day-dreaming. Fans often engage in elaborate fantasies about their idols, which can provide

an escape from reality and serve as a coping mechanism for life's stresses. However, these fantasies can also lead to unrealistic expectations and a distorted sense of reality.

Overall, the phenomenon of celebrity worship encompasses a complex interplay of substance use, behavioral addictions, personality traits, and fantasy activities. On one hand, it can foster creativity and social connections. On the other hand, potential harms of excessive engagement can negatively affect self-esteem, body image, and psychological well-being. These findings highlight the need for a balanced perspective on the impact of celebrity worship on individuals, particularly adolescents and young adults.

The future of celebrity worship research should prioritize longitudinal studies to better understand the long-term mechanisms and effects of this phenomenon. Currently, much of the international literature focuses on the negative aspects of celebrity worship, leaving a significant gap in our knowledge of its potential positive impacts. Research should explore how celebrity worship can serve as a motivating factor and its effects on mental health, potentially providing emotional support and inspiration to fans. Additionally, cross-cultural and subcultural studies are crucial to uncover the diverse ways in which celebrity worship manifests and influences individuals in different social contexts. These approaches will offer a more comprehensive understanding of the complexities and nuances of celebrity worship, informing more effective interventions and support strategies.

REFERENCES

Alperstein, N. M. (1991). Imaginary social relationships with celebrities appearing in television commercials. *Journal of Broadcasting & Electronic Media*, *35*(1), 43–58. https://doi.org/10.1080/08838159109364101

Ang, C.-S., & Chan, N.-N. (2018). Adolescents' views on celebrity worship: A qualitative study. *Current Psychology*, *37*(1), 139–148.https://doi.org/10.1007/s12144-016-9497-0

Aron, A., Aron, E. N., Tudor, M., & Nelson, G. (1991). Close relationships as including other in the self. *Journal of Personality and Social Psychology*, *60*(2), 241–253.

Aruguete, M. S., Grieve, F., Zsila, Á., Horváth, R., Demetrovics, Z., & McCutcheon, L. E. (2024). The absorption-addiction model of celebrity worship: In search of a broader theoretical foundation. *BMC Psychology*, *12*(1), 224. https://doi.org/10.1186/s40359-024-01733-6

Aruguete, M. S., Huynh, H., McCutcheon, L. E., Browne, B. L., Jurs, B., & Flint, E. (2019). Are measures of life satisfaction linked to admiration for celebrities? *Mind & Society*, *18*, 1–11. https://doi.org/10.1007/s11299-019-00208-1.

Ashe, D. D., Maltby, J., & McCutcheon, L. E. (2005). Are celebrity-worshippers more prone to narcissism? A brief report. *North American Journal of Psychology*, *7*(2), 239–246.

Baek, Y. M., Bae, Y., & Jang, H. (2013). Social and Parasocial Relationships on Social Network Sites and Their Differential Relationships with Users' Psychological Well-Being. *Cyberpsychology, Behavior, and Social Networking*, *16*(7), 512–517. https://doi.org/10.1089/cyber.2012.0510

Bennett, L. (2014). 'If we stick together we can do anything': Lady Gaga fandom, philanthropy and activism through social media. *Celebrity Studies*, *5*(1–2), 138–152. https://doi.org/10.1080/19392397.2013.813778

Bigelsen, J., Lehrfeld, J. M., Jopp, D. S., &Somer, E. (2016). Maladaptive daydreaming: Evidence for an under-researched mental health disorder. *Consciousness and Cognition*, *42*, 254–266. https://doi.org/10.1016/j.concog.2016.03.017

Billaux, P., Billieux, J., Baggio, S., Maurage, P., &Flayelle, M. (2023). Thinking beyond cut-off scores in the assessment of potentially addictive behaviors: A brief illustration in the context of binge-watching. *Journal of behavioral addictions*, *12*(2), 303-308.https://doi.org/10.1556/2006.2023.00032

Bocarnea, M. (2007). Celebrity-persona parasocial interaction scale. In *Handbook of research on electronic surveys and measurements* (pp. 309–312). IGI Global.

Brailovskaia, J., Rohmann, E., Bierhoff, H.-W., Margraf, J., &Köllner, V. (2019). Relationships between addictive Facebook use, depressiveness, insomnia, and positive mental health in an inpatient sample: A German longitudinal study. *Journal of Behavioral Addictions*, *8*(4), 703–713. https://doi.org/10.1556/2006.8.2019.63

Branch, S. E., Wilson, K. M., & Agnew, C. R. (2013). Committed to Oprah, Homer, or House: Using the investment model to understand parasocial relationships. *Psychology of Popular Media Culture*, *2*(2), 96.https://doi.org/10.1037/a0030938

Brooks, S. K. (2021). FANatics: Systematic literature review of factors associated with celebrity worship, and suggested directions for future research. *Current Psychology*, *40*(2), 864–886. https://doi.org/10.1007/s12144-018-9978-4.

Brown, W. (2015). Examining Four Processes of Audience Involvement With Media Personae: Transportation, Parasocial Interaction, Identification, and Worship. *Communication Theory*, *25*.https://doi.org/10.1111/comt.12053

Chen, O., Zhao, X., Ding, D., Zhang, Y., Zhou, H., & Liu, R. (2022). Borderline pathological celebrity worship and impulsive buying intent: Mediating and moderating roles of empathy and gender. *Frontiers in Psychology*, *13*, 823478. https://doi.org/10.3389/fpsyg.2022.823478

Cheng, C., Lau, Y. C., Chan, L., & Luk, J. W. (2021). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural

values. *Addictive behaviors*, *117*, 106845.https://doi.org/10.1016/j.addbeh.2021.106845
Cheung, C., & Yue, X. D. (2003). Identity Achievement and Idol Worship among Teenagers in Hong Kong. *International Journal of Adolescence and Youth*, *11*(1), 1–26. https://doi.org/10.1080/02673843.2003.9747914
Chiou, J., Huang, C., & Chuang, M. (2005). Antecedents of Taiwanese Adolescents' Purchase Intention Toward the Merchandise of a Celebrity: The Moderating Effect of Celebrity Adoration. *The Journal of Social Psychology*, *145*(3), 317–334. https://doi.org/10.3200/SOCP.145.3.317-334
Clement, S., Lassman, F., Barley, E., Evans-Lacko, S., Williams, P., Yamaguchi, S., Slade, M., Rüsch, N., & Thornicroft, G. (2013). Mass media interventions for reducing mental health-related stigma. *Cochrane Database of Systematic Reviews*, *7*. https://doi.org/10.1002/14651858.CD009453.pub2
Derrick, J. L., Gabriel, S., & Tippin, B. (2008). Parasocial relationships and self-discrepancies: Faux relationships have benefits for low self-esteem individuals. *Personal Relationships*, *15*(2), 261–280. https://doi.org/10.1111/j.1475-6811.2008.00197.x
Driessens, O. (2013). The celebritization of society and culture: Understanding the structural dynamics of celebrity culture. *International Journal of Cultural Studies*, *16*(6), 641–657. https://doi.org/10.1177/1367877912459140
Ferris, K. O. (2001). Through a glass, darkly: The dynamics of fan-celebrity encounters. *Symbolic Interaction*, *24*(1), 25–47.https://doi.org/10.1525/si.2001.24.1.25
Flanagan, L. M. (2008). Object relations theory. *Inside out and Outside in: Psychodynamic Clinical Theory and Psychopathology in Contemporary Multicultural Contexts*, *2*(2), 121–160.
Franssen, G. (2020). The celebritization of self-care: The celebrity health narrative of Demi Lovato and the sickscape of mental illness. *European Journal of Cultural Studies*, *23*(1), 89–111. https://doi.org/10.1177/1367549419861636
Gao, Y. X., Wang, J. Y., & Dong, G. H. (2022). The prevalence and possible risk factors of internet gaming disorder among adolescents and young adults: Systematic reviews and meta-analyses. *Journal of psychiatric research*, *154*, 35-43.https://doi.org/10.1016/j.jpsychires.2022.06.049
Giles, D. C. (2002). Parasocial interaction: A review of the literature and a model for future research. *Media Psychology*, *4*(3), 279–305.http://dx.doi.org/10.1207/S1532785XMEP0403_04
Giles, D. C. (2017). How do fan and celebrity identities become established on Twitter? A study of 'social media natives' and their followers. *Celebrity Studies*, *8*(3), 445–460. http://dx.doi.org/10.1080/19392397.2017.1305911
Gong, A.-D., & Huang, Y.-T. (2022). When young female fans were producing celebrities: The influential factors related to online fan engagement, celebrity worship, and program commitment in idol-nurturing reality shows. *Frontiers in Communication*, *7*, 931185.https://doi.org/10.3389/fcomm.2022.931185
Grant, J. E., Lust, K., & Chamberlain, S. R. (2019). Problematic smartphone use associated with greater alcohol consumption, mental health issues, poorer academic performance, and impulsivity. *Journal of Behavioral Addictions*, *8*(2), 335–342. https://doi.org/10.1556/2006.8.2019.32
Greene, A. L., & Adams-Price, C. (1990). Adolescents' secondary attachments to celebrity figures. *Sex Roles*, *23*(7–8), 335–347.
Greenwood, D., McCutcheon, L. E., Collisson, B., & Wong, M. (2018). What's fame got to do with it? Clarifying links among celebrity attitudes, fame appeal, and narcissistic subtypes. *Personality and Individual Differences*, *131*, 238–243.http://dx.doi.org/10.1016/j.paid.2018.04.032
Greenwood, D. N., Pietromonaco, P. R., & Long, C. R. (2008). Young women's attachment style and interpersonal engagement with female TV stars. *Journal of Social and Personal Relationships*, *25*(3), 387–407. https://doi.org/10.1177/0265407507087964
Griffiths, M. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10*(4).https://doi.org/10.1080/14659890500114359

Griffiths, Mark D. (2024). "Celebrity Worship, Social Media Use, and Mental Health". BiD, 52. https://doi.org/10.1344/bid2024.52.02

Hackley, C., & Hackley, R. A. (2016). The iconicity of celebrity and the spiritual impulse. *Consumption Markets & Culture*, *19*(3), 269–274. https://doi.org/10.1080/10253866.2015.1094264

He, Y. Z., & Feng, X. T. (2002). Idol worship among the youth-A sociological analysis of 207 letters from Zhao Wei fans. *Chinese Education and Society*, *35*(6), 81–94.

Hoffner, C., & Buchanan, M. (2005). Young adults' wishful identification with television characters: The role of perceived similarity and character attributes. *Media Psychology*, *7*(4).https://doi.org/10.1207/S1532785XMEP0704_2

Hollander, P. (2010). Why the Celebrity Cult? *Society*, *47*(5), 388–391. https://doi.org/10.1007/s12115-010-9348-9

Horton, D., & Wohl, R. (1956). Mass communication and para-social interaction: Observation on intimacy at a distance. *Psychiatry*, *19*(3), 215–229. https://doi.org/10.1556/2006.2024.00019

Jenkins, H. (2006). *Fans, bloggers, and gamers: Exploring participatory culture*. nyu Press.

Jia, R., Yang, Q., Liu, B., Song, H., & Wang, Z. (2023). Social anxiety and celebrity worship: The mediating effects of mobile phone dependence and moderating effects of family socioeconomic status. *BMC Psychology*, *11*(1), 364. https://doi.org/10.1186/s40359-023-01405-x

Koronczai, B., Urbán, R., Kökönyei, G., Paksi, B., Papp, K., Kun, B., ... & Demetrovics, Z. (2011). Confirmation of the three-factor model of problematic internet use on off-line adolescent and adult samples. *Cyberpsychology, Behavior, and Social Networking*, *14*(11), 657-664.https://doi.org/10.1089/cyber.2010.0345

Kruglanski, A. W., Szumowska, E., & Kopetz, C. (2021). The call of the wild: How extremism happens. *Current Directions in Psychological Science*, *30*(2), 181–185.https://doi.org/10.1177/0963721421992067.

Larson, R. (1995). Secrets in the bedroom: Adolescents' private use of media. *Journal of Youth and Adolescence*, *24*(5), 535–550. https://doi.org/10.1007/BF01537055

Lee, S. Y. (2019a). Media coverage of celebrity suicide caused by depression and increase in the number of people who seek depression treatment. *Psychiatry Research*, *271*, 598–603. https://doi.org/10.1016/j.psychres.2018.12.055

Lee, S. Y. (2019b). The Effect of Media Coverage of Celebrities with Panic Disorder on the Health Behaviors of the Public. *Health Communication*, *34*(9), 1021–1031. https://doi.org/10.1080/10410236.2018.1452093

Leets, L., De Becker, G., & Giles, H. (1995). Fans: Exploring Expressed Motivations for Contacting Celebrities. *Journal of Language and Social Psychology*, *14*(1–2), 102–123. https://doi.org/10.1177/0261927X95141006

Lian, B., Aruguete, M. S., Huynh, H., McCutcheon, L. E., & Murtagh, M. P. (2019). Is gambling addiction related to celebrity addiction? *SIS Journal of Projective Psychology and Mental Health*, *26*(2), 87–96.

Lin, Y.-C., & Lin, C.-H. (2007). Impetus for Worship: An Expolratory Study of Adolescents' Idol Adoration Behaviors. *Adolescence*, *42*(167).

Locker Jr, L., Williams, J. L., McCutcheon, L. E., Flint, E., Jorgensen, M., Weldon, C., & Huynh, H. P. (2023). Is Celebrity Admiration Related to the Stigmatization of Persons with Post-Traumatic Stress Disorder (PTSD)? *North American Journal of Psychology*, *25*(4).

Maltby, J., & Day, L. (2011). Celebrity worship and incidence of elective cosmetic surgery: Evidence of a link among young adults. *Journal of Adolescent Health*, *49*(5), 483–489.https://doi.org/10.1016/j.jadohealth.2010.12.014.

Maltby, J., & Day, L. (2017). Regulatory motivations in celebrity interest: Self-suppression and self-expansion. *Psychology of Popular Media Culture*, *6*(2), 103.

Maltby, J., Day, L., McCutcheon, L. E., Gillett, R., Houran, J., & Ashe, D. D. (2004). Personality and coping: A context for examining celebrity worship and mental health. *British Journal of Psychology*, *95*(4). https://doi.org/10.1348/0007126042369794.

Maltby, J., Day, L., McCutcheon, L. E., Houran, J., & Ashe, D. (2006). Extreme celebrity wor-

ship, fantasy proneness and dissociation: Developing the measurement and understanding of celebrity worship within a clinical personality context. *Personality and Individual Differences*, *40*(2).https://doi.org/10.1016/j.paid.2005.07.004.

Maltby, J., Giles, D. C., Barber, L., & McCutcheon, L. E. (2005). Intense-personal celebrity worship and body image: Evidence of a link among female adolescents. *British Journal of Health Psychology*, *10*(1), 17–32. https://doi.org/10.1348/135910704X15257.

Maltby, J., Houran, J., & McCutcheon, L. E. (2003). A clinical interpretation of attitudes and behaviors associated with celebrity worship. *The Journal of Nervous and Mental Disease*, *191*(1).

Maltby, J., McCutcheon, L. E., Ashe, D. D., & Houran, J. (2001). The self-reported psychological well-being of celebrity worshippers. *North American Journal of Psychology*, *3*(3), 441–452.

Maltby, J., McCutcheon, L. E., & Lowinger, R. J. (2011). Brief report: Celebrity worshipers and the five-factor model of personality. *North American Journal of Psychology*, *13*(2).

Maraz, A., Király, O., & Demetrovics, Z. (2015). Commentary on: Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research: The diagnostic pitfalls of surveys: If you score positive on a test of addiction, you still have a good chance not to be addicted. *Journal of Behavioral Addictions*, *4*(3), 151-154.https://doi.org/10.1556/2006.4.2015.026

Marwick, A. E., & Boyd, D. (2011). The drama! Teen conflict, gossip, and bullying in networked publics. *Teen Conflict, Gossip, and Bullying in Networked Publics (September 12, 2011). A Decade in Internet Time: Symposium on the Dynamics of the Internet and Society*.

McCutcheon, L. E., Aruguete, M., McCarley, N. G., & Jenkins, W. J. (2016). Further validation of an indirect measure of celebrity stalking. *Journal of Studies in Social Sciences*, *14*(1).

McCutcheon, L. E., Aruguete, M., Scott Jr, V. B., &VonWaldner, K. L. (2004). Preference for Solitude and Attitude Toward One's Favorite Celebrity. *North American Journal of Psychology*, *6*(3).

McCutcheon, L. E., Gillen, M. M., Browne, B. L., Murtagh, M., &Collisson, B. (2016). Intimate relationships and attitudes toward celebrities. *Interpersona: An International Journal on Personal Relationships*, *10*(1).

McCutcheon, L. E., Lange, R., & Houran, J. (2002). Conceptualization and measurement of celebrity worship. *British Journal of Psychology*, *93*(1), 67–87. https://doi.org/10.1348/000712602162454.

McCutcheon, L. E., Maltby, J., Houran, J., & Ashe, D. D. (2004). *Celebrity worshippers: Inside the minds of stargazers*. Publish America.

McCutcheon, L. E., Rich, G., Browne, B., & Britt, R. (2016). The relationship between attitudes toward celebrities & the five factor personality inventory at an elite Indian university: A brief report. *North American Journal of Psychology*, *18*(3), 465–472.

McCutcheon, L. E., Wong, M., Black, J., Maynard, D., Frey, R., & Rich, G. (2014). Does" irresponsibility" predict the addictive level of celebrity worship? *North American Journal of Psychology*, *16*(3).

North, A. C., Sheridan, L., Maltby, J., & Gillett, R. (2007). Attributional Style, Self-Esteem, and Celebrity Worship. *Media Psychology*, *9*(2), 291–308. https://doi.org/10.1080/15213260701285975.

Purington, A., & Whitlock, J. (2010). Non-suicidal self-injury in the media. *The Prevention Researcher*, *17*(1), 11–14.

Raviv, A., Bar-Tal, D., Raviv, A., & Ben-Horin, A. (1996). Adolescent idolization of pop singers: Causes, expressions, and reliance. *Journal of Youth and Adolescence*, *25*(5), 631–650. https://doi.org/10.1007/BF01537358

Reeves, B., & Nass, C. (1996). The media equation: How people treat computers, television, and new media like real people. *Cambridge, UK*, *10*(10).

Reeves, R. A., Baker, G. A., & Truluck, C. S. (2012). Celebrity worship, materialism, compulsive buying, and the empty self. *Psychology & Marketing*, *29*(9).https://doi.org/10.1002/mar.20553.

Roberts, K. A. (2007). Relationship attachment and the behaviour of fans towards celebrities. *Applied Psychology in Criminal Justice*, *3*(1), 54–74.

Rubin, A. M., Perse, E. M., & Powell, R. A. (1985). Loneliness, Parasocial Interaction, and Local Television News viewing. *Human Communication Research*, *12*(2), 155–180. https://doi.org/10.1111/j.1468-2958.1985.tb00071.x.

Sandvoss, C. (2005). *Fans: The mirror of consumption*. Polity.

Sansone, R. A., & Sansone, L. A. (2014). "I'm Your Number One Fan"—A clinical look at celebrity worship. *Innovations in Clinical Neuroscience*, *11*(1–2), 39.

Shaw, R. L., Whitehead, C., & Giles, D. C. (2010). 'Crack down on the celebrity junkies': Does media coverage of celebrity drug use pose a risk to young people? *Health, Risk & Society*, *12*(6), 575–589. https://doi.org/10.1080/13698575.2010.515736

Sheridan, L., Maltby, J., & Gillett, R. (2006). Pathological public figure preoccupation: Its relationship with dissociation and absorption. *Personality and Individual Differences*, *41*(3), 525–535.https://doi.org/10.1016/j.paid.2006.02.010

Somer, E. (2002). Maladaptive daydreaming: A qualitative inquiry. *Journal of Contemporary Psychotherapy*, *32*(2).https://doi.org/10.1023/A:1020597026919

Stever, G. S. (1991). The Celebrity Appeal Questionnaire. *Psychological Reports*, *68*(3), 859–866. https://doi.org/10.2466/pro.1991.68.3.859.

Stever, G. S. (2009). Parasocial and social interaction with celebrities: Classification of media fans. *Journal of Media Psychology*, *14*(3), 1–39.

Stever, G. S. (2011a). Celebrity Worship: Critiquing a Construct: Celebrity Worship. *Journal of Applied Social Psychology*, *41*(6), 1356–1370. https://doi.org/10.1111/j.1559-1816.2011.00765.x.

Stever, G. S. (2011b). Fan behavior and lifespan development theory: Explaining para-social and social attachment to celebrities. *Journal of Adult Development*, *18*, 1–7.http://dx.doi.org/10.1007/s10804-010-9100-0

Stever, G. S., & Lawson, K. (2013). Twitter as a way for celebrities to communicate with fans: Implications for the study of parasocial interaction. *North American Journal of Psychology*, *15*(2).

Swami, V., Taylor, R., & Carvalho, C. (2011). Body dissatisfaction assessed by the Photographic Figure Rating Scale is associated with sociocultural, personality, and media influences. *Scandinavian Journal of Psychology*, *52*(1), 57–63. https://doi.org/10.1111/j.1467-9450.2010.00836.x

Swaminathan, S. (2020). The Show Must Go On: A Study on Celebrity Worship during COVID19. *Journal of Humanities and Social Sciences Studies*, *2*(4), 110-122.

Toffler, A. (2022). *Powershift: Knowledge, wealth, and power at the edge of the 21st century*. Bantam.

Tulloch, J., & Jenkins, H. (1995). *Science fiction audiences: Watching doctor who and star trek*. Psychology Press.

Vallerand, R. J. (2012). The role of passion in sustainable psychological well-being. *Psychology of Well-Being: Theory, Research and Practice*, *2*, 1–21. https://doi.org/10.1111/j.1467-6494.2009.00616.x.

Vallerand, R. J., Blanchard, C., Mageau, G. A., Koestner, R., Ratelle, C., Léonard, M., Gagné, M., & Marsolais, J. (2003). Les passions de l'ame: On obsessive and harmonious passion. *Journal of Personality and Social Psychology*, *85*(4).

Wan, A., Mundel, J., & Yang, J. (2024). Impulsive and Compulsive Buying and Consumer Well-Being. In F. Sonmez (Ed.), *Fostering Consumer Well-Being: Theory, Evidence, and Policy* (pp. 315–331). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-59144-0_17

Wang, J., Cheng, Y., & Chu, Y. (2013). Effect of Celebrity Endorsements on Consumer Purchase Intentions: Advertising Effect and Advertising Appeal as Mediators. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *23*(5), 357–367. https://doi.org/10.1002/hfm.20336

Yue, X. D., & Cheung, C. (2000). Selection of favourite idols and models among Chinese

young people: A comparative study in Hong Kong and Nanjing. *International Journal of Behavioral Development*, *24*(1), 91–98.

Zhou, R., Morita, N., Ogai, Y., Saito, T., Zhang, X., Yang, W., & Yang, F. (2024). Meta-Analysis of Internet Gaming Disorder Prevalence: Assessing the Impacts of DSM-5 and ICD-11 Diagnostic Criteria. *International Journal of Environmental Research and Public Health*, *21*(6), 700.https://doi.org/10.3390/ijerph21060700

Zsila, Á., McCutcheon, L. E., & Demetrovics, Z. (2018). The association of celebrity worship with problematic Internet use, maladaptive daydreaming, and desire for fame. *Journal of Behavioral Addictions*, *7*(3), 654–664. https://doi.org/10.1556/2006.7.2018.76.

Zsila, Á., McCutcheon, L. E., Horváth, R., Urbán, R., Paksi, B., Darnai, G., Janszky, J., & Demetrovics, Z. (2024). Prevalence of celebrity worship: Development and application of the short version of the Celebrity Attitude Scale (CAS-7) on a large-scale representative sample. *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2024.00019

Zsila, Á., Orosz, G., McCutcheon, L. E., & Demetrovics, Z. (2020). A lethal imitation game? Exploring links among psychoactive substance use, self-harming behaviors and celebrity worship. *Addictive Behaviors Reports*, *12*, 100319. https://doi.org/10.1016/j.abrep.2020.100319

Zsila, Á., Urbán, R., McCutcheon, L. E., & Demetrovics, Z. (2019). A path analytic review of the association between psychiatric symptoms and celebrity worship: The mediating role of maladaptive daydreaming and desire for fame. *Personality and Individual Differences*, *151*, 109511.https://doi.org/10.1016/j.paid.2019.109511

Zsila, Á., Urbán, R., McCutcheon, L. E., & Demetrovics, Z. (2021). A new avenue to reach out for the stars: The association of celebrity worship with problematic and non-problematic social media use. *Psychology of Popular Media*, *10*(1).https://doi.org/10.1037/ppm0000275

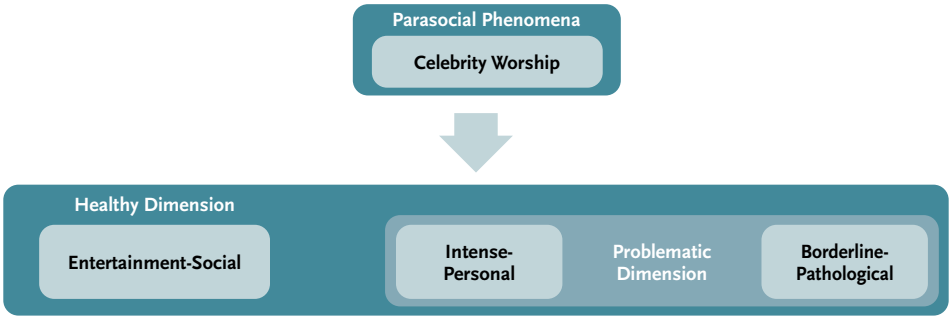
APPENDIX

Item content of the 7-item version of the CAS (CAS-7)

Item number	Item content	Indicator in further data analysis
1	I share with my favorite celebrity a special bond that cannot be described in words.	IP2
2	It is enjoyable just to be with others who like my favorite celebrity.	ES1
3	I often feel compelled to learn the personal habits of my favorite celebrity.	BP2
4	I like watching and hearing about my favorite celebrity when I am in a large group of people.	ES2
5	When something good happens to my favorite celebrity I feel like it happened to me.	IP1
6	Keeping up with news about my favorite celebrity is an entertaining pastime.	ES3
7	If someone gave me several thousand dollars to do with as I please, I would consider spending it on a personal possession (like a napkin or paper plate) once used by my favorite celebrity.	BP1

[a]Instruction: Please indicate the extent to which you agree or disagree with the following statements. 5 = *strongly agree*; 4 = *agree*; 3 = *uncertain or neutral*; 2 = *disagree*; 1 = *strongly disagree*.

[b]ES = Entertainment-Social, IP = Intense-Personal, BP = Borderline-Pathological dimension.



24

LOOT BOXES AND OTHER GAMBLING-LIKE PRODUCTS INSIDE VIDEO GAMES

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ABSTRACT:

Loot boxes and other similar products inside video games can be purchased by players with real-world money to obtain random rewards. These mechanics have been deemed as gambling-like because players are betting money on unknown outcomes. Concerns have been raised about players spending too much money and the normalization of gambling-like behaviors amongst children, who generally cannot legally access more traditional forms of gambling due to age restrictions on participation. Despite these products being relatively novel, many studies have already been conducted considering whether they might be similarly 'addictive.' Importantly, monetary spending on loot boxes is linked to problem gambling, suggesting that gambling consumers could also be at risk of loot box-related harms, or that loot box users could be particularly vulnerable to gambling harms. More research is required to better understand this association. Notwithstanding, some countries have already sought to proactively address potential harms through regulation. Multiple potential approaches, ranging from completely restricting access to merely requiring the disclosure of information related to the product, are available. The regulations' implementation should be regularly assessed to allow for countries to decide whether the rules should be changed based on scientific evidence and whether they should follow another country's example.

KEYWORDS:

loot boxes, gacha, gambling-like products and activities, computer games, videogaming regulation, novel behavioral addictions

1. INTRODUCTION

Video games companies are increasingly generating revenue not only through the sale of a copy of the software (i.e., a 'product') but also by offering players opportunities to make so-called 'in-game purchases' to access additional content (i.e., providing a 'service'). This shift from the game-as-a-product business model to that of the game-as-a-service paradigm is not inherently unethical (Neely, 2021), although it has given rise to some concerns.

Firstly, prior to the proliferation of in-game purchases, the amount players could spend on a single game was known and effectively capped because the software was purchased at a set price, after which there were very few further opportunities to spend more money. However, many recently released games are continuously maintained by companies to encourage players to make additional financial contributions in exchange for access to newer content. Under this model, spending has become potentially unlimited. A player cannot know how much they will spend in total on a specific game, but they can safely assume the opportunity to make 'microtransactions' will be regularly advertised.

Secondly, some in-game transactions involve randomization to determine what the player receives in return for spending money. The different potential outcomes vary greatly in desirability: most of the time, the player will obtain worthless or mediocre rewards, whilst rarely, the player will obtain valuable items. This encourages players to spend money on repeat purchases to attempt to get rarer items and effectively creates a gambling-like system (Drummond & Sauer, 2018). These in-game purchases involving random chance in contemporary video games have many forms (e.g., 'loot boxes' (Zendle & Cairns, 2018); 'card packs' (Xiao et al., 2024); 'gacha' and 'summoning' mechanics (Woods, 2022); and even social or simulated casino games (Gainsbury et al., 2014), and many of these games are given age ratings stating that they are suitable for young children (Xiao et al., 2023; Zendle et al., 2020). This chapter first explores the many different kinds of gambling-like products that are presently available and identifies

how the previous literature has oversimplified the situation. These new developments in the monetization of video games mean that players are now offered the opportunity to spend an unlimited amount of money on in-game purchases whose results are randomly determined (hereinafter, collectively referred to using 'loot boxes' as a shorthand). Many have argued that loot boxes are a close approximation to gambling because of the psychological and structural similarities (e.g., similarities in their design) shared between these activities, or argued that loot boxes are actually gambling (Drummond & Sauer, 2018; Nielsen & Grabarczyk, 2019; Xiao, 2022b). Yet, traditional gambling is generally heavily regulated and, even where permitted, available only to adults. In contrast, loot boxes are widely available for purchase by children (Xiao et al., 2023; Zendle et al., 2020), who might be less developmentally, psychologically, and informationally equipped to recognize the relevant risks involved (Mills et al., 2023, p. 206).

Irrespective of the age of the person who purchases a loot box, there is concern that they might experience harm. Research has found that loot box spending and engagement is linked to problematic gambling (Brooks & Clark, 2019; Kristiansen & Severin, 2019; Li et al., 2019; Zendle & Cairns, 2019), problematic video gaming (Garea et al., 2021; Spicer et al., 2022), and other traits (e.g., impulsivity) and socio-economic demographic features that are associated with engaging in more traditional addictive behaviors, such as substance misuse (Close et al., 2022; Spicer et al., 2022). This chapter therefore also comprehensively reviews the quantitative and qualitative literature on loot boxes from psychology and other fields to establish what is known and what more still needs to be learned.

Interestingly, despite loot box engagement being much more novel and significantly less studied than other behaviours known to pose the risk of addiction, many countries have sought to address potential concerns by regulating loot boxes without a robust evidence base. This chapter closes by summarizing various regulatory approaches that have been attempted globally, with an emphasis on empirical assessments as to whether they have worked in practice. The success and failures of these efforts at regulating this novel and potentially addictive behavior associated with digital technology can inform any public health policies that may be implemented to address other emerging addictive behaviors.

Finally, it should also be emphasized that irrespective of whether or not an activity is 'addictive' per se, regulation might well be justified to address consumer protection concerns. In the case of loot boxes, even though engaging with the product itself has not yet been proven to be a separate form of addiction, heavy use of loot boxes might well be a symptom of gambling or video gaming addiction, both of which have been medically recognized and addressed in other chapters of this Manual, although the latter's recognition has been controversial (Aarseth et al., 2016).

2. WHAT IS A LOOT BOX? EXPLORING THE DIFFERENT TYPES

This chapter focuses on in-game purchases involving some elements of randomization. This does not mean that other non-randomized in-game purchases (such as 'battle passes' that players buy to gain the opportunity to obtain predetermined items but only after subsequently spending significant amounts of gameplay time [Petrovskaya & Zendle, 2020]) and even non-monetized video game mechanics (such as daily login rewards that motivate the player to play) are not potentially concerning (Petrovskaya et al., 2022; Petrovskaya & Zendle, 2021). They are, as these too can potentially cause players to spend substantial sums of money or to engage in videogame play (e.g., spending purely 'too much' time absent of additional monetary expenditures) in a problematic and arguably addictive manner that is detrimental to other aspects of the player's life and their wellbeing. Indeed, there are loot boxes that can be obtained and opened entirely for free without the player having to spend any real-world money during the process (Xiao, 2022b, pp. 446–449). These non-paid or free loot boxes are similarly outside the ambit of the present chapter which deals exclusively with paid loot boxes that both involve the investment of at least some real-world money and randomization, given that stakeholders tend to be more concerned about these mechanics specifically as their potential harms are more directly obvious. The term 'loot boxes' means 'paid loot boxes' hereinafter unless otherwise specified.

The most 'traditional' loot boxes were found in games such as *Overwatch* (Blizzard Entertainment, 2016): players were given the opportunity to spend real-world money to directly purchase items that were literally called 'loot boxes' containing randomized rewards. The mechanic in other games may not be visually represented as a box, a crate, or a treasure chest being opened but it operates on similar gambling-like principles and remains clearly recognizable as such. For example, in the game *Hearthstone* (Blizzard Entertainment, 2014), the 'loot box' mechanic was represented as a pack of random cards being opened, whilst in 灌篮高手 *[Slam Dunk]* (DeNA, 2018), the loot box was portrayed as a prize wheel that randomly landed upon various spaces indicating different results (Xiao, 2022a, pp. 351–352). The 'loot boxes' of many so-called East Asian 'gacha' games (Blom, 2023), such as *Honkai Star Rail* (miHoYo, 2023), are not even depicted as an interactable object. Instead, the player 'summons' potential rewards, such as new playable characters, on so-called 'banners' that display (possibly exclusively) the most highly sought-after potential rewards. These mechanics are broadly referred to by players as 'gacha' mechanics. The literature has also debated whether social or simulated casino games, which allow the player to spend real-world money to participate in traditional gambling activities (typically highly randomized or chance-based) but, importantly, does not allow players to convert any potential winnings back into real-world money, would also constitute games with 'loot boxes' (Xiao et al., 2022; cf. Zendle et al., 2022).

In many games, loot boxes could not be purchased directly with real-world money and must be bought instead using a virtual in-game currency that was in turn bought

with real-world money. Such additional layers of currency transactions likely obfuscate the real-world monetary costs of loot boxes: for example, a loot box priced at US$0.99/EUR0.85 clearly costs exactly that, whilst in games like *Genshin Impact* (miHoYo, 2020), the actual cost of a loot box priced at 160 'primogems' (an invented, in-game currency) is a lot less clear when the player can only buy at least 300 'genesis crystals' (another in-game currency) for US$4.99/EUR4.25 that must then be converted to primogems at a ratio of 1:1; the remaining 140 primogems cannot actually be spent to buy another loot box unless the player obtains more primogems, by spending more money buying more genesis crystals.

Other games implemented even more complex procedures for obtaining and opening loot boxes. In games like *Counter-Strike: Global Offensive* (Valve, 2012), the loot box itself can be obtained without spending money, but can only be opened to get random rewards if the player spends money on a key to unlock it. Some games have gone even further, in *Diablo Immortal* (Blizzard Entertainment & NetEase, 2022), players were able to buy keys that can unlock random rewards with real-world money but then must complete certain gameplay challenges before being presented with the opportunity to spend a key in exchange for random rewards. Other games like *MapleStory M* (Nexon, 2018) offered classic loot boxes containing random content but also implemented mechanics that allowed players to spend money for a random chance to upgrade their existing items.

Another specific aspect that is highly important is whether the random content obtained can be converted into real-world money, because the presence of which often results in the relevant loot box being found to have satisfied a necessary legal element of 'gambling.' Paid loot boxes whose random content is convertible into money (e.g., because they can be transferred to another player in exchange for the other player providing cash) would constitute illegal gambling under the laws of many countries (Xiao et al., 2022).

Many other aspects of loot box design have also been implemented differently in various games (Ballou et al., 2020). Conceivably, the various types of loot boxes described above would also affect player psychology in different ways, such as how informed (or not) a decision to purchase loot boxes might be. However, much of the existing literature speaks of 'loot boxes' only as if they are a singular phenomenon, although some exceptional studies have focused on specific differences in implementation (cf Zendle et al., 2019). Players are often, for example, asked how much they have spent on loot boxes generally across many different games, and this is not particularly informative in helping us to better understand these nuanced variations of loot box mechanics. To illustrate, players who engage with 'gacha' mechanics may not even identify as someone who buys 'loot boxes' and thus under-report their spending. Future research should consider specific implementations of loot boxes, rather than generalizing and oversimplifying the whole issue.

3. REVIEW OF THE LITERATURE

3.1 Motivations for Loot Box Engagement

A number of studies have explored player motivations for loot box use through qualitative means. In a sample of 441 respondents, Zendle et al. (2019) noted that common motivations to purchase loot boxes included: for gameplay advantages (21.9% of participants), for specific items/collections (19.2%), for the thrill of it (16.0%), for cosmetic items (15.3%), to support the game (10.7%), the perception that loot boxes provide good value for money (9.8%), quicker in-game progression (6.2%), and for relatively few, to specifically 'cash out' by selling the received item (0.9%). Similarly, Nicklin et al. (2021) completed in-depth interviews with 28 players and identified motivations using inductive thematic analysis, producing seven themes that generally aligned with Zendle et al. (2019). Their results included a broader range of social factors (e.g., status, supporting a charity, the influence of others), a fear of missing out, and being nudged through specific triggers (e.g., in-game promotions). Puiras et al. (2023) noted that gambling and loot box use converge on the motivations of the chance to win something of value and an enjoyment of the activity. A series of online focus groups with adolescents (aged 14-to-17), found that young gamers generally defined gambling as having the features of: a loss of money, reliance on chance outcomes, and the risk of addiction (Rolando & Wardle, 2023), and that these characteristics also apply to loot boxes and other video game elements. Notably, the ability to cash out was not seen as a necessary feature of gambling. This suggests that regulation which has only focused on loot boxes that allow cashing out could be overly restrictive and miss the other possible harms outlined above.

3.2 Associations Between Loot Boxes and Gambling

Early research on microtransactions within video games focused upon 'social casino games'. Players have the opportunity to purchase more points to continue play or to unlock features via microtransactions (Wohl, Salmon, Hollingshead, & Kim, 2017). Social casino games are associated with increased gambling urges among those with gambling problems (Gainsbury et al., 2014; Hollingshead et al., 2016), and making microtransactions has predicted migration to online gambling (Kim et al., 2015). Gambling, social casino games, and loot boxes all share the characteristic of variable reward schedules, where behavioural reinforcement (i.e., actually winning money, points, or a desired virtual item) occurs unpredictably (Garea et al., 2021; Macey & Hamari, 2022). Variable reward schedules produce high and steady response rates (Laskowski, Dorchak, Ward, Christensen, & Euston, 2019), and may also be effective at encouraging cognitive distortions such as an overconfidence in one's ability to predict outcomes and create a sense of illusory control (King, Delfabbro, & Griffiths, 2010). In gambling, high rates of these distortions are linked to problematic behaviour (Fortune & Goodie, 2012; Yakovenko et al., 2016). Thus, given what has been empirically observed between social

casino games and gambling, it logically follows that the gambling-like loot box features of many video games will likely also link with actual gambling cognitions and behaviour.

A primary empirical finding that underscores the association between loot boxes and gambling is evidence of a positive correlation in cross-sectional surveys between measures of loot box engagement and gambling. These variables have typically centered upon loot box and gambling spending, and gambling symptoms assessed by self-report measures, such as the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). First shown by Zendle & Cairns (2018) in a large sample ($n = 7{,}422$) of players recruited through Reddit, these findings have been replicated in adult (Brooks & Clark, 2019; Li et al., 2019; von Meduna et al., 2020; Zendle & Cairns, 2019) and adolescent samples (Hing et al., 2022; Ide et al., 2021; Kristiansen & Severin, 2020; Zendle et al., 2019). Meta-analyses by Garea et al. (2021) and Spicer et al. (2022) reported average effect sizes of $r = .26$ and $r = .27$ (considered small-to-moderate effects), respectively, between loot box spending and problem gambling symptoms. In comparing loot box users to non-loot box users, Zendle & Cairns (2018) discovered that problem gamblers were more likely to purchase loot boxes than non-problem gamblers, but this did not extend to other microtransactions, suggesting a preference for loot boxes by gamblers. This finding was supported by Close et al. (2023) who found that the strength of association between problem gambling symptoms and video game spend was stronger with loot box users than non-users. Of note, almost all research on loot box engagement has come from Western countries (Xiao, Fraser, & Newall, 2023).

Using a sample of gamers from the People's Republic of China (PRC), Xiao et al. (2023) initially did not replicate the otherwise repeatedly observed positive correlation between loot box spend and PGSI score ($rs = 0.07$, not significant), and only weakly and non-meaningfully replicated the link between loot box spend and gambling engagement ($rs = 0.06$, $p = 0.04$). However, that study was underpowered. A more recent and robust PRC study did replicate the positive correlation between loot box spend and PGSI score ($rs = 0.22$, $p < .001$) and also found a link between loot box spend and gambling engagement ($rs = 0.22$, $p < .001$) (Xiao, Fraser, et al., 2024). Notwithstanding, a study of Pacific (mostly Samoan) New Zealand players failed to find an association between loot box purchasing and gambling participation (Gentles et al., 2022). Culturally unique factors, such as the limited availability of gambling, might influence the relationships between loot boxes and gambling. Significantly more research is needed of non-Western gamers to assess the generalizability of this otherwise robust link.

Research has also extended to variables beyond the relatively narrow scope of associating loot box spend with gambling spend or symptom comparisons. An attempt to broaden these analyses led to the development of the 'Risky Loot Box Index' (RLI; Brooks & Clark, 2019). This is a single factor measure of loot box-related behaviours that could be problematic. The RLI's five items align with compulsive use and preoccupation with loot boxes, as well as 'chasing' loot box items through repeated purchases, and initial tests found the RLI positively correlated with PGSI-measured gambling

symptoms across two samples (r = .315 - .491), later replicated by Drummond, Sauer, Ferguson, & Hall (2020). Perhaps expectedly, risky loot box use has also associated with problematic video game use (Brooks & Clark, 2019; Drummond, Sauer, Ferguson, & Hall, 2020), and risky use does not need to link to gambling to be harmful (Spicer, Fullwood, et al., 2022; Xiao et al., 2022). Xiao, Fraser, Nielsen, & Newall (2024) reported that a translated Simplified Chinese version of the RLI continued to correlate with problem gambling (rs = 0.31), problem video gaming (rs = 0.30), and loot box spending (rs = 0.45) in a sample from the PRC. Using item response theory, Primi et al. (2024) concluded this measure efficiently assesses the risks of loot box engagement among adolescents within an Italian sample, and that loot box engagement, expectedly, best explained risky use. Subsequent measures have also been developed such as the RAFFLE (Lloyd et al., 2021), which assesses the motivations to purchase loot boxes across seven factors (player enhancement, progression, social pressure, distraction/compulsion, altruism, fear of missing out, and item resale), and a modified 7-item Swedish version of the RLI expanded the measure to 2 factors: time spent and money spent to earn loot boxes (Forsström et al., 2022). The development and refinement of these, and future, measures will contribute to a more nuanced understanding of how loot box systems relate to player behaviours and traits.

Looking beyond measures of gambling spend or gambling symptomology, loot box engagement (measured by the RLI) has also been positively correlated with 'gambling-related cognitive distortions' (GRCDs; Brooks & Clark, 2019; Close et al., 2023). These are erroneous gambling beliefs that comprise a cognitive variable implicated in problematic gambling. For example, the *Gambler's Fallacy* is the belief that a win is 'due' after experiencing several losses in random-chance games. In a companion study to Close et al. (2023), Spicer et al. (2024) utilized a statistical method (zero-inflation Bayesian mixed-effects multiple regressions) to collapse their samples of loot box and non-loot box users into a single group. In doing so, problem gambling was no longer predictive of risky loot box engagement and less predictive of loot box spend, when problem video gaming and gambling-related cognitions were controlled for. However, gambling-related cognitions continued to predict loot box spend and engagement when controlling for problem gambling and video gaming. Spicer et al. (2024) interpreted their findings as supporting the idea that erroneous gambling beliefs could underpin both risky loot box and gambling behaviours, and therefore be responsible for overlap between these behaviours.

A primary finding of Close et al. (2023) was that greater loot box engagement positively associated with the experience of flow, where one feels fully immersed or absorbed in an activity. The authors postulate that flow could result from the broader game and subsequently influence loot box purchasing to maintain engaging gameplay, or that a motivation to escape negative affective states (e.g., low mood) through more passive distraction could incidentally lead to greater loot box use. This latter interpretation has been referred to as 'dark flow' (Dixon et al., 2018). In their second study, Spicer et

al. (2024) described a particularly complex relationship between flow and loot boxes. Specifically, that flow is negatively associated with the onset of loot box expenditure, perhaps because loot box mechanics (e.g., entering menus to purchase/open a loot box) can be disruptive to the broader game experience. However, among their participants who already initiated loot box use, flow became predictive of higher loot box spend and risky use. As outlined by Spicer et al. (2024), this could signal either a transition to game experience enhancement by loot box obtained items or a state of escape due to the mechanism itself (i.e., dark flow). The concept of flow has received significant attention in the gambling literature and has been identified as one reason for continued gambling (Dixon et al., 2018; Murch, Chu, & Clark, 2017; Murch et al., 2020; Murch & Clark, 2019). Their research highlights another cognitive mechanism shared by both loot boxes and gambling and emphasizes the need for further exploration of the link between flow and in-game microtransactions, especially across different implementations of loot box mechanics.

Rarer and more desirable loot box rewards elicited 'post reinforcement pauses' from participants (Larche et al., 2021). These pauses represent a delay in the response-contingent behaviour (i.e., buying/opening another loot box) after receiving a desired reward. These same authors also reported that loot box outcomes are associated with increased physiological arousal as measured by skin conductance. These are regularly reported behavioural and physiological reactions in gambling (Dixon et al., 2013). In sum, the collective research on loot boxes and gambling have demonstrated that the activities positively correlate at the behavioural, psychological, and even physiological levels.

3.3 Research Investigating Causal Pathways

Researchers in this area have regularly noted that causal interpretations cannot be inferred via analyses using cross-sectional data. Of course, understanding the directionality would provide valuable insight for the development of sensible consumer protections. Two possible pathways have generally been proposed as possible interpretations (Brooks & Clark, 2019; House of Commons Digital, Culture, Media, and Sport Committee, 2019; Spicer, Fullwood, et al., 2022). First is the concern that loot boxes could both introduce and encourage involvement in conventional gambling among players (Macey & Hamari, 2022; Spicer et al., 2022; Zendle & Cairns, 2018). This pathway, of loot boxes leading to subsequent gambling, has been referred to as the 'gateway hypothesis' (Spicer et al., 2022) or 'migration' (Brooks & Clark, 2023), and is similar to the finding that social casino game microtransaction use predicted subsequent gambling onset (Kim et al., 2015). A mechanistic explanation of this pathway could involve engagement of the dopamine system and the process of incentive sensitization, engaged by the uncertain reward outcomes of loot boxes (Zack, St. George, & Clark, 2020). This could increase incentive values of cues that become associated with desired loot box outcomes (e.g., the audio-visual experience; 'near-miss' outcomes). Data also indicates that an earlier onset of gambling, such as during adolescence, is a risk factor for later gambling

problems (Kessler et al., 2008). This implies that youth could be sensitized to gambling-like behaviour through loot box features at an age where conventional gambling is otherwise prohibited.

The second commonly proposed causal direction is the 'reverse' pathway, which proposes that individuals who are already experiencing gambling problems could be disproportionately drawn to loot boxes because of their behavioural and psychological similarities to gambling (Brooks & Clark, 2019; Spicer et al., 2022; Zendle, 2019; Zendle & Cairns, 2018). This suggests separate regulatory action that would target gamblers as a vulnerable group to reduce financial harms when gaming. Both causal directions can exist, and other explanations involving third variables or respondent perceptions have been commented upon. Sidloski et al. (2022) found some evidence that gamers could be reporting symptoms of loot box use when completing problem gambling measures. Although the size of this effect was modest and cannot explain the full relationship (Xiao et al., 2024), it is a reminder that alternative explanations (in this case, ambiguous survey question wording) need to be empirically tested.

An increasing number of studies have focused upon these causal pathways, including some initial longitudinal work. Zendle (2019) conducted a survey on players ($n = 112$) of the game *Heroes of the Storm*, both before and after the publisher removed loot boxes from the game (with other microtransactions retained). Only individuals identified as 'Problem Gamblers' via the PGSI (Ferris & Wynne, 2001) reduced spending following this change. Zendle (1019) interpreted this as support for the reverse pathway, where gamblers were drawn specifically to loot box features. Spicer et al. (2022) utilized a cross-sectional survey to explore the respondents' ($n = 1{,}102$) retrospective impressions about the influence loot box and gambling behaviours had upon each other. Approximately one-in-five participants endorsed a migration effect, attributing prior loot box use to later gambling behaviour, and another one-in-five endorsed the reverse. Endorsement of either pathway was associated with significantly higher PGSI scores, more gambling cognitions, risky loot box use, and greater gambling spend. Yet, retrospective data has some key limitations, including necessitating participants' own awareness of causal influences and the accurate recall of past experiences and behaviours. Spicer et al. (2022) support the viability of both pathways and suggest that at least some gamers view the migration and reverse pathways as a possible explanation for their behaviour. Contrary to the above, in an experiment by D'Amico et al. (2022), participants ($n = 153$) played a video game for twenty minutes in one of three groups: loot boxes, non-randomized rewards, and no rewards. After this exposure, they completed a well-established behavioral risk-taking task (Balloon Analogue Risk-Taking task), and strong evidence for no effect between these two behaviours was found. However, due to the brief nature of D'Amico et al. (2022) task, their results do not rule out the possibility of a cumulative sensitization to gambling from regular loot box use over months or years.

The regulatory discussion around loot boxes and gambling generally assumes that randomized reward mechanics underlie the proposed causal link between the

behaviours. Video games also offer non-randomized items for purchase, and the initial study by Zendle & Cairns (2018) on loot boxes showed that these were not linked to problem gambling, but later studies have not been as definitive about this lack of relationship (Close et al., 2022; Drummond et al., 2020; Zendle & Cairns, 2019). To attempt to clarify this, Brooks & Clark (2023) conducted a six-month longitudinal study using a sample of self-identified non-gamblers (baseline $n = 415$; follow-up $n = 291$). Between baseline and follow-up, 33 non-gamblers reported initiating gambling activity. Using logistic regressions, baseline loot box spending and the RLI predicted both migration to gambler status and subsequent gambling spend. A participant was 24.9% more likely to migrate per doubling of loot box expenditure, and 61.6% more likely per standard unit increase on the RLI. Notably, baseline loot box spending continued to significantly predict migration to gambling when these non-randomized purchases were controlled for, and non-randomized purchases stopped predicting migration to gambling when loot box purchases were controlled. This was interpreted as evidence of: (1) a temporal link extending from loot boxes to later gambling, and (2) that the randomized reward mechanisms of loot boxes drive this relationship (rather than a general tendency to make microtransactions). Looking at the reverse pathway, Brooks & Clark (2023) applied a new classification variable (loot box use vs. no loot box use) to create a group of baseline participants that were loot box non-users and this produced mixed evidence. While baseline gambling-related cognitions were predictive of loot box onset by six-month follow-up, gambling expenditure and PGSI score were not. This is somewhat consistent with Spicer et al. (2024), who noted gambling-related cognitions may underpin the broader relationships between loot box engagement, gambling spends, and problem gambling.

A longitudinal study conducted by González-Cabrera et al. (2023) sought to explore the stability of loot box purchases among minors (baseline $n = 2,817$; follow-up $n = 2,213$; aged 11-17 years-old), and to assess for temporal associations between loot box purchasing at baseline and six-month follow-up gambling and gaming behaviour. The authors found that a majority of participants who purchased loot boxes at baseline continued to do so at follow-up (56.2%). Given the many variables that likely influence loot box purchasing, such as having access to fiat currency as a minor, parental supervision, and school obligations, this result can be interpreted as relative stability of the behaviour. González-Cabrera et al. (2023) also found that loot box purchasing minors (compared to non-purchasers) were more likely to report gambling at follow-up, both gambling disorder symptoms and gaming disorder symptoms; but this depended heavily upon participant gender. Loot box purchasing girls were 3.59 times more likely to endorse gambling (1.96 times for boys), as well as 10.7 times and 8.91 times more likely to meet criteria for online gambling and gaming problems, respectively, when compared to their non-loot box purchasing counterparts. Loot box purchasing boys did not score significantly higher on these symptom measures than non-purchasing.

González-Cabrera et al. (2023) both reinforce the evidence of a migration pathway and expand its presence to include adolescence.

In the longitudinal work described above, causal pathways are inferred from the temporal ordering of variables. Yet, temporal precedence is not enough to establish causality; this also requires covariance between the variables and elimination of possible third variable explanations for the perceived relationship (Duckworth et al., 2010). As described throughout this section, there is abundant evidence for covariation between loot boxes and gambling, and early evidence of the migration to gambling pathway. However, more work needs to be done to strengthen the evidence for temporal relationships and rule out possible alternative explanations.

A longitudinal study by Wardle & Tipping (2023) points to one potential third variable explanation. The authors assessed several gambling activities at baseline among adolescents aged 16-to-26. In their 'parsimonious model', loot boxes were removed as a non-significant predictor, whereas 'skin betting' (the use of virtual items as a currency to gamble with) remained predictive of increased PGSI scores. Notably, even if skin betting fully accounts for the relationship, loot boxes would presumably still need to be purchased in order to gamble with the received virtual items, meaning the potential for financial harm remains. Other possible third variables have been considered in cross-sectional studies. Hing et al. (2022) reported that loot box purchasing behaviour continued to increase the odds of at-risk and problem gambling, when controlling for other gambling behaviours. Coelho et al. (2023) found that loot box purchases and their risky use remained significant predictors of problem gambling, when controlling well-known risk factors in the gambling literature (depression, anxiety, adverse childhood experiences, emotional dysregulation, and the tendency to act impulsively when experiencing negative emotions). This could be explained by evidence that loot box use and gambling actually differ in their risk and protective factors (DeCamp, 2021), and therefore the traditional risk factors of gambling might not play a significant confounding role in the relationship between loot box spending and gambling.

With the continued developments in the research on loot boxes and gambling, we can expect a steady shift from acknowledging the association towards better understanding the specific mechanisms and directions that produce the relationship. The early longitudinal work has started to provide some evidence for the migration from loot boxes to gambling, and it has also highlighted the random reward mechanism as the specific contributor to this pathway. Yet, for directional causality to be clearly established, much more work needs to be done to explore the potential effects of other variables within longitudinal studies. For example, as Brooks & Clark (2023) highlight, the unmeasured variable of low parental supervision could explain both youth engagement with loot boxes, and then subsequent onset of gambling behaviour. Gambling-related cognitive distortions are one of the cognitive variables that deserve significantly more attention in the now burgeoning literature on loot boxes. These have been shown to account for a significant portion of risky loot box use (Brooks & Clark, 2019), and perhaps generally

underpin the detected relationships between gambling and loot box behaviours (Spicer et al., 2024). Should subsequent work demonstrate that gambling cognitions are a primary explanatory variable for the link, then, to borrow from Drummond & Sauer (2018), this would be evidence that loot boxes are 'psychologically akin' to gambling.

4. REGULATION

Scientific evidence on the potential harms of loot boxes is still emerging, and the public's understanding of these mechanics is still developing. Nonetheless, a number of countries have already adopted regulations to deal with the issue as a precaution (Leahy, 2022). A wide range of different approaches have been put into practice, ranging from prohibiting access by banning the mechanic entirely to merely requiring certain information to be provided by companies to players to help them make more informed decisions (Xiao, Henderson, Nielsen, et al., 2022).

4.1 Belgium: Banning Loot Boxes

Belgium has taken the most restrictive approach: the country's gambling regulator published a report explaining that all paid loot boxes, irrespective of whether their rewards can be converted into real-world money, constitute illegal gambling under the pre-existing national gambling law (which differs from those of other countries, which would only prohibit paid loot boxes whose rewards can be converted into cash as discussed above), thus banning them for both children and adults because even people aged 18 and above are not permitted to participate in illegal gambling (Belgische Kansspelcommissie [Belgian Gaming Commission], 2018). A number of major companies reported complying with the law (e.g., 2K Games, 2018; Nintendo, 2019) by removing either the ability to purchase loot boxes or withdrawing the games entirely from the country's market. However, in 2022, 82 of the 100 highest-grossing iPhone games were found to have continued to sell loot boxes despite the supposed 'ban' (Xiao, 2023b). The law has not been enforced beyond the publication of the original report due to practical difficulties, including a lack of funding for the regulator.

This case demonstrates that attempting to regulate a specific aspect of video games (or digital technology more broadly) is extremely difficult: more than one million games are available for iPhones alone, and it simply is unrealistic to expect a traditional regulator to moderate all of that content. Instead, governments might consider funding regulators sufficiently to ensure that they can regulate the most popular products, such as the 500 highest-grossing games (rather than every available product, which would be impossible to do), and ensure their compliance. This would not eliminate the problem entirely but can provide substantial protection to players as spending on video games is known to be highly concentrated in the most popular games: 85% of all spending was estimated to be on the 100 top-grossing games (Joseph et al., 2023, p. 7253). If adopting such an

approach, governments ought to be transparent about what is achievable in order not to mislead the public into believing that they are better protected than they actually are, which might cause them to be less careful and thus more vulnerable to harm.

4.2 Germany & Australia: Minimum Age Ratings

Instead of preventing everyone, including adults, from purchasing loot boxes like Belgium tried, but failed, to do, Germany and Australia have adopted policies requiring that the presence of loot boxes must be considered when making video game age rating decisions. These decisions would produce an age rating, which would be the official guidance for players and parents on whether a game is suitable for children under a certain age. In Australia, from September 2024 onwards, games with loot boxes must be rated M or 'not recommended' for children under 15 at a minimum (Guidelines for the Classification of Computer Games 2023 (Cth) (Australia)). A similar policy has been in force in Germany from January 2023 onwards (§ 10b (3) JuSchG (Jugendschutzgesetz [Protection of Young Persons Act]). Although German law does not set out a minimum age rating per se, unlike in Australia, rating decisions since made by the age rating organization have shown that, as a matter of practice, games with loot boxes would always be given at least 'USK 12' or approved for individuals aged 12 or above (Xiao, 2024c). However, the rating organization retains the right to give a lower age rating to games with loot boxes if the circumstances justify such a decision. This approach may effectively restrict young children's access to loot boxes, thus reducing harm. However, it also encourages companies to abandon the young children's market and to focus instead only on older consumer groups; this would negatively affect the amount of gameplay content available to younger children, who may be less able to derive the many benefits of video game play, ranging from entertainment to opportunities to socialize and practice certain skills. Government could instead consider requiring companies to produce child-appropriate versions of the game that do not generate revenue using loot boxes instead.

4.3 China, South Korea, UK, EU and Others: Information Disclosure

Other regions have been less interventionist in their regulations. Instead of preventing or limiting access, companies are required to provide more information about their products so that consumers can make more informed purchasing decisions. Neither players' ability to purchase loot boxes nor companies' ability to sell loot boxes have been curtailed. Broadly speaking, two types of disclosures have been required.

4.4 Presence Disclosure

The UK (Committee of Advertising Practice & Broadcast Committee of Advertising Practice, 2021) and the EU (through the European Commission (2021)) have required that companies must disclose that a game contains loot boxes in any advertising. This is because this information is important for some consumers when deciding whether

to purchase or download the game. The UK advertising regulator has enforced this rule by upholding multiple complaints against video game companies for failing to disclose loot box presence on app store listing pages and in social media advertising (Advertising Standards Authority, 2023a, 2023b, 2024a, 2024b, 2024c). Age rating organizations in North America and Europe (Entertainment Software Rating Board [ESRB], 2020; Pan European Game Information [PEGI], 2020; and Unterhaltungssoftware Selbstkontrolle [USK], 2022) have also adopted rules requiring companies to disclose loot box presence and now provide this information alongside the age rating, although this disclosure message has been criticized for failing to sufficiently inform consumers about loot boxes' potential harms (Garrett et al., 2022; Xiao, 2021). Unfortunately, many games' store listings and advertising materials remain non-compliant because the regulators of other countries have been less proactive with enforcement, and it is difficult to inform companies based in faraway regions (e.g., in China, the US, and Israel) about their obligations and force them to comply (Xiao, 2023a, 2023c, 2024a).

4.5 Probability Disclosure

Mainland China, Taiwan, South Korea, and the EU require companies to inform players about the probabilities of getting different potential rewards from loot boxes (Xiao, 2024b). This is intended to help players better estimate how much money they might need to spend for a given item by providing transparency. The exact requirements differ across countries: for example, Taiwan requires the provision of a specific warning message stating that buying loot boxes is a chance-based activity and does not guarantee that the player obtains any specific rewards. App stores, like those of Apple and Google, have also required probability disclosures as a matter of self-regulation in other regions, such as the UK, despite there being no explicit legal regulations requiring them in those geographic regions. Research has found that a majority of games now do make probability disclosures for their main loot box mechanic (Xiao et al., 2021, 2023). However, these disclosures are often not easy to access; for example, requiring many manual steps to be taken by the player before the disclosures would be eventually shown or displaying the disclosures only in an image that is non-text searchable. This means that players may not always have easy access to probability disclosures. Governments should require companies to make probability disclosures using an industry standard manner that is easily accessible and visually prominent to reduce the burden on consumers to try to find disclosures made in different ways in various games. No research has yet been conducted on whether this measure reduces overspending.

5. CONCLUSION

Loot boxes and other purchases that players can make inside video games that involve randomization are controversial because they are gambling-like. A scientific literature

has developed around why people buy loot boxes; how loot box and gambling behaviours link together (with an emphasis on problematic use); and what this means in terms of loot box use potentially encouraging subsequent gambling, and vice versa. A more nuanced understanding requires future studies to better account for, *inter alia*, the perspectives of non-Western players and how loot boxes are implemented differently in individual games. A number of countries have already attempted to regulate these novel products due to concerns around overspending and the normalization of gambling, particularly amongst children. Irrespective of whether purchasing loot boxes itself is an 'addiction' per se, high spending might be a symptom of gambling or video gaming addiction. A degree of precautionary regulation is likely justified to protect consumers by, for example, providing more transparency. Many different regulatory approaches of varying degrees of restrictiveness could potentially be imposed. Whether companies are complying with regulations and whether players are benefiting from stricter regulations in practice should be continually monitored.

REFERENCES

2K Games. (2018). *Statement Belgium*. 2K Games Official Website. https://www.2k.com/myteaminfo/be/

Aarseth, E., Bean, A. M., Boonen, H., Colder Carras, M., Coulson, M., Das, D., Deleuze, J., Dunkels, E., Edman, J., Ferguson, C. J., Haagsma, M. C., Helmersson Bergmark, K., Hussain, Z., Jansz, J., Kardefelt-Winther, D., Kutner, L., Markey, P., Nielsen, R. K. L., Prause, N., ... Van Rooij, A. J. (2016). Scholars' Open Debate Paper on the World Health Organization ICD-11 Gaming Disorder Proposal. Journal of Behavioral Addictions, 6(3), 267–270. https://doi.org/10.1556/2006.5.2016.088

Advertising Standards Authority. (2023a, October 4). *ASA Ruling on Hutch Games Ltd [concerning F1 Clash on the Apple App Store] A23-1196857*. https://www.asa.org.uk/rulings/hutch-games-ltd-a23-1196857-hutch-games-ltd.html

Advertising Standards Authority. (2023b, October 4). *ASA Ruling on Hutch Games Ltd [concerning Rebel Racing on the Google Play Store] A23-1196862*. https://www.asa.org.uk/rulings/hutch-games-ltd-a23-1196862-hutch-games-ltd.html

Advertising Standards Authority. (2024a, March 20). *ASA Ruling on Electronic Arts Ltd A23-1222185*. https://www.asa.org.uk/rulings/electronic-arts-ltd-a23-1222185-electronic-arts-ltd.html

Advertising Standards Authority. (2024b, March 20). *ASA Ruling on Jagex Ltd A23-1216471*. https://www.asa.org.uk/rulings/jagex-ltd-a23-1216471-jagex-ltd.html

Advertising Standards Authority. (2024c, March 20). *ASA Ruling on Miniclip (UK) Ltd A23-1216455*. https://www.asa.org.uk/rulings/miniclip--uk--ltd-a23-1216455-miniclip--uk--ltd.html

Ballou, N., Gbadamosi, C. T. T., & Zendle, D. (2020). The hidden intricacy of loot box design: A granular description of random monetized reward features. In *Proceedings of DiGRA 2022*. DiGRA 2022, Krakow, Poland. PsyArXiv. https://doi.org/10.31234/osf.io/xeckb

Belgische Kansspelcommissie [Belgian Gaming Commission]. (2018). *Onderzoeksrapport loot boxen [Research Report on Loot Boxes]*. https://web.archive.org/web/20200414184710/https://www.gamingcommission.be/opencms/export/sites/default/jhksweb_nl/documents/onderzoeksrapport-loot-boxen-final-publicatie.pdf

Blom, J. (2023). The Genshin Impact Media Mix: Free-to-Play Monetization from East Asia. *Mechademia*, *16*(1), 144–166.

Brooks, G. A., & Clark, L. (2019). Associations between loot box use, problematic gaming and gambling, and gambling-related cognitions. *Addictive Behaviors*, *96*, 26–34. https://doi.org/10.1016/j.addbeh.2019.04.009

Brooks, G. A., & Clark, L. (2023). The gamblers of the future? Migration from loot boxes to gambling in a longitudinal study of young adults. *Computers in Human Behavior*, *141*(September 2022), 107605. https://doi.org/10.1016/j.chb.2022.107605

Close, J., Spicer, S. G., Nicklin, L. L., Lloyd, J., & Lloyd, H. (2022). Loot box engagement: Relationships with educational attainment, employment status and earnings in a cohort of 16,000 UK gamers. *Addiction*, *117*(8), 2338–2345. https://doi.org/10.1111/add.15837

Close, J., Spicer, S. G., Nicklin, L. L., Uther, M., Whalley, B., Fullwood, C., ... Lloyd, H. (2023). Exploring the relationships between psychological variables and loot box engagement, part 1: Pre-registered hypotheses. *Royal Society Open Science*, *10*(12). https://doi.org/10.1098/rsos.231045

Coelho, S. G., Keough, M. T., Hodgins, D. C., Shead, N. W., Parmar, P. K., & Kim, H. S. (2023). Loot box purchasing is associated with gambling and problem gambling when controlling for known psychological risk factors of gambling. *Addiction Research and Theory*, *31*(4), 260–269. https://doi.org/10.1080/16066359.2022.2141717

Committee of Advertising Practice & Broadcast Committee of Advertising Practice. (2021,

September 20). *Guidance on advertising in-game purchases*. https://www.asa.org.uk/resource/guidance-on-advertising-in-game-purchases.html

D'Amico, N. J., Drummond, A., de Salas, K., Lewis, I., Waugh, C., Bannister, B., & Sauer, J. D. (2022). No effect of short term exposure to gambling like reward systems on post game risk taking. *Scientific Reports*, *12*(1), 1–12. https://doi.org/10.1038/s41598-022-21222-3

DeCamp, W. (2021). Loot Boxes and Gambling: Similarities and Dissimilarities in Risk and Protective Factors. *Journal of Gambling Studies*, *37*(1), 189–201. https://doi.org/10.1007/s10899-020-09957-y

Digital, Culture, Media and Sport Committee of the House of Commons (UK). (2019). Immersive and Addictive Technologies: Fifteenth Report of Session 2017–19 (HC 1846). https://publications.parliament.uk/pa/cm201719/cmselect/cmcumeds/1846/1846.pdf

Dixon, M. J., MacLaren, V., Jarick, M., Fugelsang, J. A., & Harrigan, K. A. (2013). The Frustrating Effects of Just Missing the Jackpot: Slot Machine Near-Misses Trigger Large Skin Conductance Responses, But No Post-reinforcement Pauses. *Journal of Gambling Studies*, *29*(4), 661–674. https://doi.org/10.1007/s10899-012-9333-x

Dixon, M. J., Stange, M., Larche, C. J., Graydon, C., Fugelsang, J. A., & Harrigan, K. A. (2018). Dark flow, depression and multiline slot machine play. *Journal of Gambling Studies*, *34*(1), 73–84. https://doi.org/10.1007/s10899-017-9695-1

Drummond, A., & Sauer, J. D. (2018). Video Game Loot Boxes Are Psychologically Akin to Gambling. *Nature Human Behaviour*, *2*(8), 530–532. https://doi.org/10.1038/s41562-018-0360-1

Drummond, A., Sauer, J. D., Ferguson, C. J., & Hall, L. C. (2020). The relationship between problem gambling, excessive gaming, psychological distress and spending on loot boxes in Aotearoa New Zealand, Australia, and the United States-A cross-national survey. *PLoS ONE*, *15*(3), 1–16. https://doi.org/10.1371/journal.pone.0230378

Entertainment Software Rating Board (ESRB). (2020, April 13). Introducing a New Interactive Element: In-Game Purchases (Includes Random Items). *ESRB Official Website*. https://www.esrb.org/blog/in-game-purchases-includes-random-items/

European Commission. (2021, December 29). *Commission Notice – Guidance on the interpretation and application of Directive 2005/29/EC of the European Parliament and of the Council concerning unfair business-to-consumer commercial practices in the internal market (C/2021/9320) [2021] OJ C526/1*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021XC1229(05)

Ferris, J., & Wynne, H. (2001). The Canadian Problem Gambling Index: Final Report. *Ottawa: Canadian Centre on Substance Abuse*. Retrieved from http://www.cclat.ca/2003 and earlier CCSA Documents/ccsa-008805-2001.pdf

Forsström, D., Chahin, G., Savander, S., Mentzoni, R. A., & Gainsbury, S. (2022). Measuring loot box consumption and negative consequences: Psychometric investigation of a Swedish version of the Risky Loot Box Index. *Addictive Behaviors Reports*, *16*(August), 0–5. https://doi.org/10.1016/j.abrep.2022.100453

Fortune, E. E., & Goodie, A. S. (2012). Cognitive distortions as a component and treatment focus of pathological gambling: A review. *Psychology of Addictive Behaviors*, *26*(2), 298–310. https://doi.org/10.1037/a0026422

Gainsbury, S. M., Hing, N., Delfabbro, P. H., & King, D. L. (2014). A taxonomy of gambling and casino games via social media and online technologies. *International Gambling Studies*, *14*(2), 196–213. https://doi.org/10.1080/14459795.2014.890634

Gainsbury, S. M., Hing, N., Delfabbro, P., Dewar, G., & King, D. L. (2014). An exploratory study of interrelationships between social casino gaming, gambling, and problem gambling. *International Journal of Mental Health and Addiction*, *13*(1), 136–153. https://doi.org/10.1007/s11469-014-9526-x

Garea, S. S., Drummond, A., Sauer, J. D., Hall, L. C., & Williams, M. N. (2021). Meta-anal-

ysis of the relationship between problem gambling, excessive gaming and loot box spending. *International Gambling Studies*, *21*(3), 460–479. https://doi.org/10.1080/14459795.2021.1914705

Garrett, E., Drummond, A., Lowe-Calverley, E., & Sauer, J. D. (2022). Current loot box warnings are ineffective for informing consumers. *Computers in Human Behavior*, *139*, 107534. https://doi.org/10.1016/j.chb.2022.107534

Gentles, D., Taufa, S., Berking, G., Siataga, P., Ah-Honi, P., & Jacinta, F.-F. (2022). Are video game loot boxes associated with gambling among young Pacific adults in New Zealand? Pacific Health Dialog, 21(9), 596–603. https://doi.org/10.26635/phd.2022.129

González-Cabrera, J., Basterra-González, A., Ortega-Barón, J., Caba-Machado, V., Díaz-López, A., Pontes, H. M., & Machimbarrena, J. M. (2023). Loot box purchases and their relationship with internet gaming disorder and online gambling disorder in adolescents: A prospective study. *Computers in Human Behavior*, *143*(January). https://doi.org/10.1016/j.chb.2023.107685

Hing, N., Rockloff, M., Russell, A. M. T., Browne, M., Newall, P., Greer, N., … Thorne, H. (2022). Loot box purchasing is linked to problem gambling in adolescents when controlling for monetary gambling participation. *Journal of Behavioral Addictions*, *11*(2), 396–405. https://doi.org/10.1556/2006.2022.00015

Hollingshead, S. J., Kim, H. S., Wohl, M. J. A., & Derevensky, J. L. (2016). The social casino gaming-gambling link: Motivation for playing social casino games determines whether self-reported gambling increases or decreases among disordered gamblers. *Journal of Gambling Issues*, *2016*(33), 52–67. https://doi.org/10.4309/jgi.2016.33.4

Ide, S., Nakanishi, M., Yamasaki, S., Ikeda, K., Ando, S., Hiraiwa-Hasegawa, M., … Nishida, A. (2021). Adolescent problem gaming and loot box purchasing in video games: Cross-sectional observational study using population-based cohort data. *JMIR Serious Games*, *9*(1), 1–6. https://doi.org/10.2196/23886

Joseph, D., Nieborg, D., & Young, C. J. (2023). One Big Store: Source Diversity and Value Capture of Digital Games in National App Store Instances. *International Journal of Communication*, *17*(0), Article 0.

Kessler, R. C., Hwang, I., Labrie, R., Petukhova, M., Sampson, N. A., Winters, K. C., & Shaffer, H. J. (2008). DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological Medicine*, *38*(9), 1351–1360. https://doi.org/10.1017/S0033291708002900

Kim, H. S., Wohl, M. J. A., Salmon, M. M., Gupta, R., & Derevensky, J. (2015). Do social casino gamers migrate to online gambling? An assessment of migration rate and potential predictors. *Journal of Gambling Studies*, *31*(4), 1819–1831. https://doi.org/10.1007/s10899-014-9511-0

King, D., Delfabbro, P., & Griffiths, M. (2010). Video game structural characteristics: A new psychological taxonomy. *International Journal of Mental Health and Addiction*, *8*(1), 90–106. https://doi.org/10.1007/s11469-009-9206-4

Kristiansen, S., & Severin, M. C. (2019). Loot box engagement and problem gambling among adolescent gamers: Findings from a national survey. *Addictive Behaviors*, *103*, 106254. https://doi.org/10.1016/j.addbeh.2019.106254

Larche, C. J., Chini, K., Lee, C., Dixon, M. J., & Fernandes, M. (2021). Rare Loot Box Rewards Trigger Larger Arousal and Reward Responses, and Greater Urge to Open More Loot Boxes. *Journal of Gambling Studies*, *37*(1), 141–163. https://doi.org/10.1007/s10899-019-09913-5

Laskowski, C. S., Dorchak, D. L., Ward, K. M., Christensen, D. R., & Euston, D. R. (2019). Can Slot-Machine Reward Schedules Induce Gambling Addiction in Rats? *Journal of Gambling Studies*, *35*(3), 887–914. https://doi.org/10.1007/s10899-019-09852-1

Leahy, D. (2022). Rocking the Boat: Loot Boxes in Online Digital Games, the Regulatory Challenge, and the EU's Unfair Commercial Practices Directive. *Journal of Consumer Policy*, *45*, 561–592. https://doi.org/10.1007/s10603-022-09522-7

Lee Duckworth, A., Tsukayama, E., & May, H. (2010). Establishing Causality Using Lon-

gitudinal Hierarchical Linear Modeling: An Illustration Predicting Achievement From Self-Control. *Social Psychological and Personality Science*, *1*(4), 311–317. https://doi.org/10.1177/1948550609359707

Li, W., Mills, D., & Nower, L. (2019). The Relationship of Loot Box Purchases to Problem Video Gaming and Problem Gambling. *Addictive Behaviors*, *97*, 27–34. https://doi.org/10.1016/j.addbeh.2019.05.016

Lloyd, J., Nicklin, L. L., Spicer, S. G., Fullwood, C., Uther, M., Hinton, D. P., … Close, J. (2021). Development and validation of the raffle; a measure of reasons and facilitators for loot box engagement. *Journal of Clinical Medicine*, *10*(24). https://doi.org/10.3390/jcm10245949

Macey, J., & Hamari, J. (2022). Gamblification: A definition. *New Media and Society*. https://doi.org/10.1177/14614448221083903

Mills, S., Ash, J., & Gordon, R. (2023). Children and Young People's Experiences and Understandings of Gambling-Style Systems in Digital Games: Loot Boxes, Popular Culture, and Changing Childhoods. *Annals of the American Association of Geographers*, *Advance online publication*, 1–18. https://doi.org/10.1080/24694452.2023.2248293

Murch, W. S., & Clark, L. (2019). Effects of bet size and multi-line play on immersion and respiratory sinus arrhythmia during electronic gaming machine use. *Addictive Behaviors*, *88*(August 2018), 67–72. https://doi.org/10.1016/j.addbeh.2018.08.014

Murch, W. S., Chu, S. W. M., & Clark, L. (2017). Measuring the slot machine zone with attentional dual tasks and respiratory sinus arrhythmia. *Psychology of Addictive Behaviors*, *31*(3), 375–384. https://doi.org/10.1037/adb0000251

Murch, W. S., Ferrari, M. A., McDonald, B. M., & Clark, L. (2020). Investigating Flow State and Cardiac Pre-ejection Period During Electronic Gaming Machine Use. *Frontiers in Psychology*, *11*(February), 1–8. https://doi.org/10.3389/fpsyg.2020.00300

Neely, E. L. (2021). Come for the Game, Stay for the Cash Grab: The Ethics of Loot Boxes, Microtransactions, and Freemium Games. *Games and Culture*, *16*(2), 1555412019887658. https://doi.org/10.1177/1555412019887658

Nicklin, L. L., Spicer, S. G., Close, J., Parke, J., Smith, O., Raymen, T., … Lloyd, J. (2021). "It's the attraction of winning that draws you in"—a qualitative investigation of reasons and facilitators for videogame loot box engagement in UK gamers. *Journal of Clinical Medicine*, *10*(10). https://doi.org/10.3390/jcm10102103

Nielsen, R. K. L., & Grabarczyk, P. (2019). Are Loot Boxes Gambling? Random Reward Mechanisms in Video Games. *Transactions of the Digital Games Research Association*, *4*(3), 171–207. https://doi.org/10.26503/todigra.v4i3.104

Nintendo. (2019, May 21). *Belangrijke informatie voor gebruikers in België [Important Information for Users in Belgium]*. Nintendo Belgium. https://www.nintendo.be/nl/Nieuws/2019/mei/Belangrijke-informatie-voor-gebruikers-in-Belgie-1561911.html

Pan European Game Information (PEGI). (2020, April 13). *PEGI Introduces Notice To Inform About Presence of Paid Random Items*. PEGI Official Website. https://pegi.info/news/pegi-introduces-feature-notice

Petrovskaya, E., & Zendle, D. (2020). *The Battle Pass: A Mixed-Methods Investigation into a Growing Type of Video Game Monetisation*. https://doi.org/10.31219/osf.io/vnmeq

Petrovskaya, E., & Zendle, D. (2021). Predatory Monetisation? A Categorisation of Unfair, Misleading and Aggressive Monetisation Techniques in Digital Games from the Player Perspective. In *Journal of Business Ethics* (Vol. 181, pp. 1065–1081). https://doi.org/10.1007/s10551-021-04970-6

Petrovskaya, E., Deterding, S., & Zendle, D. (2022). Prevalence and Salience of Problematic Microtransactions in Top-Grossing Mobile and PC Games: A Content Analysis of User Reviews. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems: Vol. Article No.: 560* (pp. 1–12). ACM (Association for Computing Machinery). https://doi.org/10.1145/3491102.3502056

Primi, C., Sanson, F., & Donati, M. A. (2024). Measuring Risky Loot Box Use: An Item Response Theory Analysis of the Risky Loot Box Index Among Adolescents. *Psychology of Addictive Behaviors*. https://doi.org/10.1037/adb0001009

Puiras, E., Oliver, C., Cummings, S., Sheinin, M., & Mazmanian, D. (2023). Motives to engage with or refrain from gambling and loot box content: an exploratory qualitative investigation. *Journal of Gambling Studies*, *39*(2), 779–794. https://doi.org/10.1007/s10899-022-10116-8

Rolando, S., & Wardle, H. (2023). 'That's why it's gambling, because you don't know what you find in it!' Perceptions of the relationship between gaming and gambling among young adult gamers. *Journal of Youth Studies*. https://doi.org/10.1080/13676261.2023.2174012

Sidloski, B., Brooks, G. A., Zhang, K., & Clark, L. (2022). Exploring the association between loot boxes and problem gambling: Are video gamers referring to loot boxes when they complete gambling screening tools? *Addictive Behaviors*, *131*(November 2021), 107318. https://doi.org/10.1016/j.addbeh.2022.107318

Spicer, S. G., Close, J., Nicklin, L. L., Uther, M., Whalley, B., Fullwood, C., … Lloyd, H. (2024). Exploring the relationships between psychological variables and loot box engagement, part 2: exploratory analyses of complex relationships. *Royal Society Open Science*, *11*(1). https://doi.org/10.1098/rsos.231046

Spicer, S. G., Fullwood, C., Close, J., Nicklin, L. L., Lloyd, J., & Lloyd, H. (2022). Loot boxes and problem gambling: Investigating the "gateway hypothesis." *Addictive Behaviors*, *131*(March), 107327. https://doi.org/10.1016/j.addbeh.2022.107327

Spicer, S. G., Nicklin, L. L., Uther, M., Lloyd, J., Lloyd, H., & Close, J. (2022). Loot boxes, problem gambling and problem video gaming: A systematic review and meta-synthesis. *New Media & Society*, *24*(4), 1001–1022. https://doi.org/10.1177/1461444821102717 5

USK (Unterhaltungssoftware Selbstkontrolle). (2022, December 14). *In-Game-Käufe, Chats und Lootboxen: USK erweitert Prüfkriterien—Unterhaltungssoftware Selbstkontrolle [In-game purchases, chats and loot boxes: USK expands test criteria]*. https://usk.de/usk-pressemitteilung-umsetzung-neues-jugendschutzgesetz/

von Meduna, M., Steinmetz, F., Ante, L., Reynolds, J., & Fiedler, I. (2020). Loot boxes are gambling-like elements in video games with harmful potential: Results from a large-scale population survey. *Technology in Society*, *63*(October 2019), 101395. https://doi.org/10.1016/j.techsoc.2020.101395

Wardle, H., & Tipping, S. (2023). The relationship between problematic gambling severity and engagement with gambling products: Longitudinal analysis of the Emerging Adults Gambling Survey. *Addiction*, *118*(6), 1127–1139. https://doi.org/10.1111/add.16125

Wohl, M. J. A., Salmon, M. M., Hollingshead, S. J., & Kim, H. S. (2017). An examination of the relationship between social casino gaming and gambling: The bad, the ugly, and the good. *Journal of Gambling Issues*, *2017*(35), 1–23. https://doi.org/http://dx.doi.org/10.4309/jgi.2017.35.11

Woods, O. (2022). The Economy of Time, the Rationalisation of Resources: Discipline, Desire and Deferred Value in the Playing of Gacha Games. *Games and Culture*, *17*(7–8), 1075–1092. https://doi.org/10.1177/15554120221077728

Woods, O. (2024). The affective embeddings of gacha games: Aesthetic assemblages and the mediated expression of the self. *New Media and Society*, *26*(2), 823–838. https://doi.org/10.1177/14614448211067756

Xiao, L. Y. (2021). ESRB's and PEGI's Self-Regulatory 'Includes Random Items' Labels Fail to Ensure Consumer Protection. *International Journal of Mental Health and Addiction*, *19*(6), 2358–2361. https://doi.org/10.1007/s11469-020-00329-6

Xiao, L. Y. (2022a). Drafting Video Game Loot Box Regulation for Dummies: A Chinese Lesson. *Information & Communications Technology Law*, *31*(3), 343–381. https://doi.org/10.1080/13600834.2022.2088062

Xiao, L. Y. (2022b). Which Implementations of Loot Boxes Constitute Gambling? A UK

Legal Perspective on the Potential Harms of Random Reward Mechanisms. *International Journal of Mental Health and Addiction*, *20*(1), 437–454. https://doi.org/10.1007/s11469-020-00372-3

Xiao, L. Y. (2023a). Beneath the label: Unsatisfactory compliance with ESRB, PEGI, and IARC industry self-regulation requiring loot box presence warning labels by video game companies. *Royal Society Open Science*, *10*(3), Article 230270. https://doi.org/10.1098/rsos.230270

Xiao, L. Y. (2023b). Breaking Ban: Belgium's Ineffective Gambling Law Regulation of Video Game Loot Boxes. *Collabra: Psychology*, *9*(1), Article 57641. https://doi.org/10.1525/collabra.57641

Xiao, L. Y. (2023c). Shopping Around for Loot Box Presence Warning Labels: Unsatisfactory Compliance on Epic, Nintendo, Sony, and Microsoft Platforms. *ACM Games: Research and Practice*, *1*(4), Article 25. https://doi.org/10.1145/3630631

Xiao, L. Y. (2024a). *Illegal loot box advertising on social media: An empirical study using the Meta and TikTok ad transparency repositories*. https://doi.org/10.31219/osf.io/s92j3

Xiao, L. Y. (2024b). Loot Box State of Play 2023: Law, Regulation, Policy, and Enforcement Around the World. *Gaming Law Review*, *28*, Forthcoming. https://doi.org/10.1089/glr2.2024.0006

Xiao, L. Y. (2024c, April 25). Is loot box presence in video games being correctly and consistently labelled? Comparing all age rating decisions made by the German USK, the American ESRB, and the European PEGI in 2023. *Proceedings of 2024 IEEE Gaming, Entertainment, and Media Conference (GEM)*. 2024 IEEE Gaming, Entertainment, and Media Conference (GEM). https://doi.org/10.31219/osf.io/765zb

Xiao, L. Y., Fraser, T. C., & Newall, P. W. S. (2023). Opening Pandora's Loot Box: Weak Links Between Gambling and Loot Box Expenditure in China, and Player Opinions on Probability Disclosures and Pity-Timers. *Journal of Gambling Studies*, *39*(2), 645–668. https://doi.org/10.1007/s10899-022-10148-0

Xiao, L. Y., Fraser, T. C., Nielsen, R. K. L., & Newall, P. W. S. (2024). Loot boxes, gambling-related risk factors, and mental health in Mainland China: A large-scale survey. Addictive Behaviors, 148, Article 107860. https://doi.org/10.1016/j.addbeh.2023.107860

Xiao, L. Y., Fraser, T. C., Nielsen, R. K. L., & Newall, P. W. S. (2024). Loot boxes, gambling-related risk factors, and mental health in Mainland China: A large-scale survey. *Addictive Behaviors*, *148*(September 2023), 107860. https://doi.org/10.1016/j.addbeh.2023.107860

Xiao, L. Y., Henderson, L. L., & Newall, P. (2023). What are the odds? Lower compliance with Western loot box probability disclosure industry self-regulation than Chinese legal regulation. *PLOS ONE*, *18*(9), Article e0286681. https://doi.org/10.1371/journal.pone.0286681

Xiao, L. Y., Henderson, L. L., & Newall, P. W. S. (2022). Loot boxes are more prevalent in United Kingdom video games than previously considered: Updating Zendle et al. (2020). *Addiction*, *117*(9), 2553–2555. https://doi.org/10.1111/add.15829

Xiao, L. Y., Henderson, L. L., Nielsen, R. K. L., & Newall, P. W. S. (2022). Regulating gambling-like video game loot boxes: A public health framework comparing industry self-regulation, existing national legal approaches, and other potential approaches. *Current Addiction Reports*, *9*(3), 163–178. https://doi.org/10.1007/s40429-022-00424-9

Xiao, L. Y., Henderson, L. L., Yang, Y., & Newall, P. W. S. (2021). Gaming the system: Suboptimal compliance with loot box probability disclosure regulations in China. *Behavioural Public Policy*, *Advance Online Publication*, 1–27. https://doi.org/10.1017/bpp.2021.23

Xiao, L. Y., Newall, P., & James, R. J. E. (2024). To screen, or not to screen: An experimental comparison of two methods for correlating video game loot box expenditure and problem gambling severity. Computers in Human Behavior, 151, Article 108019. https://doi.org/10.1016/j.chb.2023.108019

Xiao, L. Y., Petrovskaya, E., Zendle, D., Nielsen, R., & Newall, P. (2024). *Card packs, loot boxes and gambling*. https://doi.org/10.17605/OSF.IO/U3BYZ

Yakovenko, I., Hodgins, D. C., el-Guebaly, N., Casey, D. M., Currie, S. R., Smith, G. J., ... Schopflocher, D. P. (2016). Cognitive distortions predict future gambling involvement. *International Gambling Studies*, *16*(2), 175–192. https://doi.org/10.1080/14459795.2016.1147592

Zack, M., St. George, R., & Clark, L. (2020). Dopaminergic signaling of uncertainty and the aetiology of gambling addiction. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *99*(August 2019), 109853. https://doi.org/10.1016/j.pnpbp.2019.109853

Zendle, D. (2019). Problem gamblers spend less money when loot boxes are removed from a game: A before and after study of Heroes of the Storm. *PeerJ*, *2019*(10). https://doi.org/10.7717/peerj.7700

Zendle, D., & Cairns, P. (2018). Video game loot boxes are linked to problem gambling: Results of a large-scale survey. *PLOS ONE*, *13*(11), e0206767. https://doi.org/10.1371/journal.pone.0206767

Zendle, D., & Cairns, P. (2019). Loot boxes are again linked to problem gambling: Results of a replication study. *PLOS ONE*, *14*(3), e0213194. https://doi.org/10.1371/journal.pone.0213194

Zendle, D., Cairns, P., Barnett, H., & McCall, C. (2019). Paying for loot boxes is linked to problem gambling, regardless of specific features like cash-out and pay-to-win. *Computers in Human Behavior*, *102*, 181–191. https://doi.org/10.1016/j.chb.2019.07.003

Zendle, D., Cairns, P., Meyer, R., Waters, S., & Ballou, N. (2022). If everything is a loot box, nothing is: Response to Xiao et al. *Addiction*, *117*(9), 2555–2556. https://doi.org/10.1111/add.15976

Zendle, D., Meyer, R., & Over, H. (2019). Adolescents and loot boxes: links with problem gambling and motivations for purchase. *Royal Society Open Science*, *6*(6), 190049. https://doi.org/10.1098/rsos.190049

Zendle, D., Meyer, R., Cairns, P., Waters, S., & Ballou, N. (2020). The prevalence of loot boxes in mobile and desktop games. *Addiction*, *115*(9), 1768–1772. https://doi.org/10.1111/add.14973

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GAME TRANSFER PHENOMENA: IN THE SPECTRUM BETWEEN COMMON EXPERIENCES AND PATHOLOGICAL DISTURBANCES

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ABSTRACT:

Game Transfer Phenomena (GTP) are involuntary experiences in which content and stimuli derived from video games carry over into everyday life, often manifesting as sensory and cognitive intrusions or distortions. These occurrences can lead to temporary changes in perception and a sense of self-agency. Manifestations include re-experiencing images, sounds, tactile and body sensations from games and impulsive actions towards game-related cues. GTP falls within a spectrum, encompassing typical everyday experiences to symptoms of psychopathology that lead to distress and dysfunction. While GTP are not inherently dysfunctional, they can pose challenges for vulnerable individuals and have been linked to negative consequences. Some forms of GTP resemble symptoms of mental disorders, and GTP can be so engrossing that they can interfere with ongoing tasks and even provoke confusion and sensations of unreality. Most gamers who report GTP do not have a history of mental disorders or drug use. However, evidence suggests that there are underlying psychopathological processes involved in GTP, and case studies have demonstrated that GTP plays a significant role in the maintenance of gaming disorder (GD). Supported by research findings on GTP and clinical observations, this chapter discusses the extent to which GTP can be classified as a disorder and its correlation with psychopathology. It examines how GTP experiences interact with GD, highlighting common factors.

KEYWORDS:

Game Transfer Phenomena, mental disorders, Gaming disorder, dissociations, psychosis, Hallucinogen-persisting perception disorder

1. INTRODUCTION

Game Transfer Phenomena (GTP) are involuntary experiences in which content and stimuli derived from video games carry over into everyday life, often manifesting as sensory and cognitive intrusions or distortions. These occurrences can lead to temporary changes in perception and a sense of self-agency, potentially causing distress and dysfunction. Examples of GTP include re-experiencing images, sounds, tactile sensations, and bodily sensations after playing or sensations of still being in the game when responding to game-related cues with impulsive actions (Ortiz de Gortari, 2019).

The first study on GTP involved 42 Swedish gamers aged 16 to 19 and explored how video games influenced their fantasies and perceptions of the world. The results indicated that some gamers re-experienced game images and sounds and sometimes reacted unconsciously to game elements in real-life situations (Ortiz de Gortari et al., 2011).

A follow-up study collected gamers' experiences from online forums to explore the various manifestations of GTP across sensory channels, including visual and auditory stimuli, as well as thoughts and behaviours (Ortiz de Gortari & Griffiths, 2014a; Ortiz de Gortari & Griffiths, 2014c; Ortiz de Gortari & Griffiths, 2014d). Following this, quantitative studies were conducted and a scale was developed to assess GTP, measure its prevalence among gamers, and identify associated factors (Ortiz de Gortari & Griffiths, 2016; Ortiz de Gortari et al., 2016; Ortiz de Gortari et al., 2015; Ortiz de Gortari, 2015b).

GTP can be experienced by both nonclinical and clinical populations of gamers, and do not appear to have harmful effects or be as distressing as intrusive thoughts or hallucinations, which are hallmarks of some mental disorders when these are prevalent and provoke dysfunction. Neither do GTP appear to entail the same negative consequences as excessive gaming in Gaming Disorder (GD) (Ortiz de Gortari, 2023a). However, when frequent or prolonged, can be distressing and may interfere with ongoing tasks (Ortiz de Gortari & Diseth, 2022; Ortiz de Gortari & Griffiths, 2019; Ortiz de Gortari et al., 2016) and in some cases may also provoke sensations of unreality (Ortiz de Gortari

& Griffiths, 2014a). Even infrequent GTP intrusions can pose challenges, particularly among vulnerable individuals (Le et al., 2023). This is particular evident among those who interpret these experiences as signs of mental illness, as well as among those attempting to reduce their time playing (Ortiz de Gortari & Basche, 2021).

GTP episodes usually last just seconds to minutes; however, there are documented instances where GTP persists for extended periods, including hours, days, or even duration (Ortiz de Gortari & Griffiths, 2014a; Ortiz de Gortari & Griffiths, 2014c, 2016). GTP often occurs shortly after cessation of playing, typically within 24 hours. However, many gamers report experiencing GTP days, weeks, months, or even years after playing, suggesting that the content of video games—such as words, images, and concepts—remains cognitively active long after the actual playing has stopped (Llamas-Alonso et al., 2025; Ortiz de Gortari & Griffiths, 2016a).

This chapter presents an overview of research findings on GTP and clinical observations to contextualise GTP within the spectrum ranging from common everyday experiences to signs and symptoms that result in distress and dysfunction in psychopathology.

The chapter also discusses the extent to which GTP can be classified as a disorder and its associations with psychopathology. It further examines how GTP experiences interact with GD and the common factors associated with them.

The chapter is divided into four main sections. First, the introduction covers definitions and the most common forms of GTP, along with prevalence and frequency of GTP, aetiology, and theoretical perspectives. The second section discusses the risk factors associated with GTP, including both precipitating and predisposing factors, as well as the potential risks of GTP and their clinical implications. The third section examines the similarities between GTP experiences and the symptoms of various mental disorders, highlighting how certain GTP experiences appear to mimic these symptoms. Finally, the chapter concludes with a summary of the key insights presented throughout the chapter.

1.1 The prevalence of GTP

The current understanding of GTP is primarily derived from studies employing cross-sectional surveys and utilising the GTP-20 scale for assessment (See appendix A for the items of the scale). The scale was developed after conducting a series of qualitative studies to identify the manifestations of GTP in various forms. This includes GTP manifestations across sensory modalities (visual, auditory, multi-sensorial, kinesthetics or corporeal), as well as automatic mental processes, actions and behaviours responses (Ortiz de Gortari, 2019). To date, the GTP scale has been validated with populations of different cultural backgrounds, including Turkish, Polish, Chinese, Spanish, Mexican, Indonesian and Greek (Cudo et al., 2022; Dindar & de Gortari, 2017; Noya, 2026; Ortiz de Gortari & Cudo, 2023; Ortiz de Gortari et al., 2015; Wang et al., 2024).

Furthermore, a range of research methods has been employed, including diaries, experimental designs, interviews, and the analysis of secondary data (Ortiz de Gortari, 2019). The findings indicate that GTP is prevalent, with most of the gamers reporting

experiencing at least one type of GTP in their lifetime or within the last 12 months (Ortiz de Gortari, 2019; Ortiz de Gortari & Diseth, 2022). The GTP-20 scale, widely utilised in GTP studies (>7,000 participants), indicates that almost all gamers (>95% according to available studies) have experienced GTP at some point in their lifetime. (Cudo, Andrzej et al., 2022; Dindar & Ortiz de Gortari, 2017; Ortiz de Gortari & Cudo, 2023a; Ortiz de Gortari & Griffiths, 2016a; Sifonis, 2018).

Recent advancements in GTP assessment, such as the GTP-MDS (GTP Multidimensional Scale) with 34 items, also report a high prevalence (95%) (Ortiz de Gortari & Diseth, 2022). In contrast, assessing GTP utilising the short version of the GTP-20 scale (GTP5-SF) indicates that only around 51-52% reported having experienced GTP within the past 12 months (Maldonado-Murciano et al., 2023; Ortiz de Gortari et al., 2026). Validation studies of GTP measures suggest that experiencing GTP more than once may be more reliable for identifying individuals who are more susceptible to GTP (Cudo et al., 2022).

A comparative analysis of similar phenomena suggests that the occurrence of GTP is relatively low, comparable to involuntary semantic memories or mind-pops (Llamas-Alonso et al., 2025). A study conducted during the pandemic revealed that participants reported experiencing a range of intrusive phenomena: earworms were noted by 92% of participants, GTP by 91%, intrusive thoughts and imagery (ITI) by 90%, mobile phone intrusions (including vibrations and ringing) by 67%, and hallucinations by 49% (Ortiz de Gortari, 2024).

GTP manifests along a continuum that ranges from mild to severe degrees of intensity. The classification has been determined by the frequency of GTP episodes as well as the total number of forms of GTP reported (Ortiz de Gortari et al., 2016). Based on the GTP-20 items scale, the severity index of GTP was established on a scale of 0 to 80 points, where mild = 1 to 26 points, moderate = 27 to 53, and severe = 54 to 80. Most gamers report multiple manifestations of GTP, but the frequency of GTP is usually low. A study reported that 7% of the participants experienced GTP intensely, as indicated by frequent and diverse experiences related to GTP (Ortiz de Gortari et al., 2016).

1.2 Most common forms of GTP

The operationalisation of gamers' experiences has revealed variations in the manifestation of GTP. Understanding these manifestations is essential for elucidating the underlying mechanisms of GTP and its potential implications. The predominant reported forms of GTP manifest as endogenous phenomena, encompassing thoughts, mental imagery, visual sensations, and persistent auditory perceptions lingering in the mind (Ortiz de Gortari & Diseth, 2022; Ortiz de Gortari &Griffiths, 2016). Conversely, exogenous manifestations of GTP occur when the game content is perceived externally, usually as negative afterimages or hallucinations. Examples include visuals in peripheral vision or auditory perceptions originating from objects associated with the game. For instance, 19% have reported seeing images with open eyes (Ortiz de Gortari & Diseth, 2022).

GTP also manifests as distortions in the perception of real-world objects, as well as, environments and misinterpretations of real-life stimuli, wherein ambiguous shapes are perceived as game content or actual sounds are mistaken for those from the game (Ortiz de Gortari & Griffiths, 2014a). In certain instances, these perceptions can prompt behavioural responses from gamers such as reproducing game actions or approaching objects perceived as game-related (Ortiz de Gortari & Griffiths, 2014d). Furthermore, some players may experienced dissociative episodes involving derealisation and depersonalisation, such as perceiving themselves as still immersed in the game or behaving as their game characters (Ortiz de Gortari & Diseth, 2022; Ortiz de Gortari, Griffiths, 2016).

1.3 Aetiology and theoretical explanation of GTP

Little is known about the aetiology of GTP. Since GTP involves a wide range of phenomena, it has been argued that there may be different mechanisms involved. The main theories that have been posed regarding GTP are outlined in this section, but for more details, see (Ortiz de Gortari, Cudo, et al., 2024). The theories are regarding: i) priming or associative learning, ii) prediction errors and neural adaptations and iii) disinhibition of visual and neurological processes involved in dopamine release.

Priming, also known as associative learning, has been considered a fundamental mechanism behind GTP (Llamas-Alonso, 2025, 2026; Ortiz de Gotari, 2019). This occurs through repeated exposure to sensory stimuli —such as visual, auditory, and tactile inputs— which leads to the formation of connections with specific actions and emotions (Yee & Bailenson, 2009).

Perceptual distortions and hallucinatory phenomena in GTP can be understood through the framework of prediction errors (Corlett et al., 2007), wherein players perceive stimuli based on their preconceived expectations aligned with the game's rules (Ortiz de Gortari & Griffiths, 2014a).

Furthermore, neural adaptations offer an additional explanation for these sensory experiences, particularly when individuals become deeply immersed in the virtual environment. This level of immersion can lead to a temporary alteration in sensory perception, resulting in a delayed readjustment to normal sensory awareness upon disengagement from the game (Dyson, 2010).

The disinhibition of visual and neurological processes has been proposed as a possible explanation for visual experiences that exhibit clinical features similar to Flashbacks (FB or Type I) and Hallucinogen Persisting Perception Disorder (HPPD or Type II) (Lerner et al., 2014; Martinotti et al., 2018). These experiences may occur following the use of psychedelics and mind-expanding substances, and can include phenomena such as afterimages, palinopsia, and halos (Vis et al., 2021). Specifically, it has been considered that the impairment of cortical serotonergic inhibitory interneurons, which are responsible for Gamma-Aminobutyric Acid (GABA) production, affects the mechanisms that filter out irrelevant sensory stimuli in certain regions of the brain (Fraser, 2022; McConnell et al., 2023). This disruption in sensory gating may contribute to the occurrence of visual GTP

experiences, by allowing the brain to continue processing visual information even after the image is no longer present in the visual field (Ortiz de Gortari, Cudo, et al., 2024).

Ortiz de Gortari et al. (2024) also drew attention to the irregular dopamine release associated with gaming disorder (GD) (Tian et al., 2023), hallucinations in schizophrenia (Howes et al., 2012), and perceptual disturbances in hallucinogen persisting perception disorder (HPPD) (Martinotti et al., 2018), which might play a role in GTP.

2. RISK FACTORS FOR GTP

Risk factors can be categorised into two main types: precipitating factors and predisposing factors. Precipitating factors are those that trigger the immediate onset of a problem, while predisposing or susceptibility factors are those that exist before the development of a problem and increase the likelihood of an individual developing a particular problem. This distinction is essential for understanding the complex interplay of factors contributing to various conditions including those associated with GTP risk.

2.1 Precipitator factors

The factors that contribute to the occurrence of GTP are closely linked to gaming habits and the gameplay itself. One key element is the amount of time spent playing. Also, environmental conditions and specific triggers can affect the emergence of GTP, including variations in lighting, and the individual's psychological state, which may involve feelings of anxiety or fatigue. Furthermore, the type of video games and their properties appear to precipitate different forms of GTP.

2.1.1 *Gaming habits*

Longer playing sessions or an increase in time playing have been associated with experiencing GTP more frequently (Dindar & Ortiz de Gortari, 2017; Ortiz de Gortari & Griffiths, 2016). However, the impact of playing time and frequency on GTP has not been conclusively proven in all studies and individual factors have emerged to be more important in the susceptibility to GTP (Llamas-Alonso et al., 2025). Long playing time (e.g., 6 hours or more) as well as, playing as a form of escapism has been associated with experiencing GTP very frequently and in several forms in comparison to experiencing mild or moderate levels of GTP (Ortiz de Gortari et al., 2016).

It has been also argued that prolonged playing like engaging in a demanding cognitive task may facilitate states of fatigue, which tend to compromise control over executive functions like attention and reasoning (Van der Linden et al., 2003) which can promote automatic responses to game-related cues. Moreover, prolonged immersion can enhance the neural adaptations that appear to be involved in experiencing heightened body sensations or recurrently seeing images (Aardema et al., 2010; Chang et al., 2020).

Poor gaming-related sleep hygiene, a construct encompassing behaviours such as diminished sleep duration due to video game engagement, gaming immediately prior to bedtime, and the persistence of playing despite experiencing fatigue (Ortiz de Gortari & Panagiotidi, 2023) has been specifically associated with GTP-related behaviours (Ortiz de Gortari & Panagiotidi, 2023a).

2.1.2 *Game related-cues, environmental and individual psychological states*

The factors influencing precipitators beyond the confines of the game session encompass environmental conditions, as well as individual states of anxiety or fatigue.

Game related-cues can refer to physical stimuli simulated in the game or stimuli linked to the gameplay experience. GTP is often elicited via automatic associative mechanisms that link present environmental input with previously encoded gaming experiences, particularly during awake states, the most common condition in which GTP manifest (Ortiz de Gortari & Griffiths, 2016a). Under conditions of wakefulness, GTP typically arise when individuals engage in automatic tasks that do not require focused attention, sharing similarities with mind-wandering (e.g., cooking, walking, driving, listening to music, watching a film, staring at things, zoning out) (Llamas-Alonso et al., 2025; Ortiz de Gortari & Griffiths, 2016).

Environmental conditions such as variations in lighting, particularly transitions from brightly lit to tim environments, have been linked to visual experiences in GTP (Basche & Ortiz de Gortari, 2023a), showing phenomenological similarities to perceptual alterations reported in conditions such as HPPD (Hallucinogen Persistent Perceptual Disorder) (Lerner et al., 2013). GTP can also occur during transitional phases between wakefulness and sleep (Ortiz de Gortari & Griffiths, 2016a), in these cases, darkness appears to act as a trigger (Basche & Ortiz de Gortari, 2023). When GTP occurs during the transition from wakefulness to sleep, it exhibits characteristics akin to hypnagogic state (i.e., the phase between being awake and asleep, in which sensory experiences can take place) (Ghibellini & Meier, 2023), which do not necessarily engage declarative memory systems (Stickgold et al., 2000).

Individual psychological states include mental fatigue, which has been associated with specific GTP forms, encompassing physical sensations, auditory perceptions, and automatic thoughts (Ortiz de Gortari & Griffiths, 2014a). Notably, physical fatigue exhibits a significant association solely with body-related experiences, which may involve symptoms of neural adaptation, including unbalanced and uncoordinated movements (Ortiz de Gortari & Panagiotidi, 2023).

Anxiety and stress have been identified as significant precipitating factors for GTP. For instance, individuals have reported seeing images from the game when experiencing heightened nervousness when receiving academic grades, when prompted to respond in class, or when facing adrenaline-inducing situations during sport tournaments (Ortiz de Gortari & Griffiths, 2014; Ortiz de Gortari et al., 2011).

2.1.3 *The type of games played*

GTP has been found in a wide variety of video game genres. Studies comparing the effects of different video game genres on GTP are lacking, but it has been argued that the structural characteristics, or game mechanics, may activate various dimensions of GTP (Ortiz de Gortari, 2019). Realistic graphics can further enhance GTP by boosting immersion levels, making it easier for GTP to be triggered by environmental cues related to game elements. However, it is important to emphasize that GTP is not confined to any particular game genre, platform (e.g., PCs, console, mobile devices) or virtual and augmented reality systems (Ortiz de Gortari, 2017; Ortiz de Gortari et al., 2023). Evidence indicates that it occurs across more than 400 video games spanning diverse genres (Ortiz de Gortari, 2016).

Research indicates that highly popular categories of video games such as first-person shooters (FPS), adventure and action games, as well as role-playing games are the ones recurrently associated with GTP. Additionally, high levels of GTP have been associated with simulators, adventure games, FPS, music games, puzzle games, and dance games, whereas action and racing games tend to result in lower to moderate levels of GTP (Zabielska-Mendyk & Cudo, 2022a). A minority of participants reported experiencing GTP in the context of educational games (Ortiz de Gortari, 2019).

2.2 Predisposing or susceptibility factors

Research has identified susceptibility factors for GTP among demographics, personality traits, cognitive processes and emotional factors, including proneness to cognitive intrusions and underlying psychopathology, substance use and cultural influences (Llamas-Alonso et al., 2025; Ortiz de Gortari & Panagiotidi, 2023a; Ortiz de Gortari & Diseth, 2022; Ortiz de Gortari & Griffiths, 2015; Ortiz de Gortari & Panagiotidi, 2023b; Wang et al., 2024).

2.2.1 *Demographic factors*

Research findings reveal a discrepancy concerning gender susceptibility to GTP. Most studies indicate that males exhibit greater vulnerability (Cudo, Andrzej et al., 2022; Wang et al., 2024), however, some research suggests that females may be at higher risk (Sifonis, 2018) or have found no significant differences between genders (Dindar & Ortiz de Gortari, 2017; Ortiz de Gortari & Mark, 2015). It has been argued that the type of game being played can affect susceptibility based on gender (Cudo, Andrzej et al., 2022).

In terms of age, research indicates that this can significantly influence media preferences as well as the adverse effects associated with playing video games. These effects may include increased aggressive thoughts and behaviours (Burkhardt & Lenhard, 2022), as well as a heightened attachment to avatars (Smahel et al., 2008) which may plausibly be associated with the occurrence or intensity of GTP.

Evidence shows that phenomena associated with GTP are particularly prevalent among young people, suggesting that this group may be more susceptible to its effects.

For instance, children and adolescents are more likely to experience hallucinations (Yates et al., 2021) and are also more vulnerable to motion sickness, a susceptibility that generally diminishes with age (Cha et al., 2021).

Most of the research on GTP has focused on adult participants. Young adults appear to be more likely to experience GTP compared to older adults. Specifically, a study has shown that individuals aged 18 to 22 tend to experience GTP more frequently and in different forms (Ortiz de Gortari et al., 2016). The only study that directly compared adults with minors found that minors are more likely to experience automatic thoughts and altered body perceptions (Dindar & Ortiz de Gortari, 2017).

2.2.2 *Personality factors*

Neuroticism, openness and schizotypal personality have been associated with GTP (Alonso et al., 2025; Ortiz de Gortari & Gackenbach, 2021). Reports of vivid daydreaming and susceptibility to hallucinations have been linked to neuroticism (Larøi et al., 2005), suggesting that this personality trait may significantly influence both vulnerability to GTP and its associated risks, as neuroticism increases emotional reactivity and heightened sensitivity to negative stimuli.

Interestingly, fantasy proneness and creativity, which is typically associated with openness, has also emerged as a predictor of GTP, and openness has been correlated with GTP (Ortiz de Gortari & Gackenbach, 2021) highlighting its relevance for understanding GTP-related risk.

Schizotypy has been identified as a predictor of GTP (Llamas-Alonso et al., 2022). As represents a phenotypic indication of vulnerability to schizophrenia, which includes subtle but clinically significant irregularities in cognition, emotion, perception, and social behaviour. Additionally, a tendency for magical thinking has been linked to schizotypy (Elek et al., 2021), which may further increase the likelihood of negatively interpreting GTP experiences.

2.2.3 *Cognitive processes and self-control*

Evidence show that individuals susceptible to GTP tend to become distracted, diverting their attention from their current task to internal thoughts or external stimuli related to the game. This shift in focus ultimately contributes to the onset of GTP. Therefore, various studies have assessed cognitive functions and their relation to GTP, via self-report measures and cognitive tasks (Llamas-Alonso et al., 2025; Ortiz de Gortari & Panagiotidi, 2023). Cognitive failures and failures in attention assessed via self-reports have been associated with GTP (Ortiz de Gortari & Panagiotidi, 2023a; Ortiz de Gortari & Panagiotidi, 2023b). However, only commission errors in the Sustained Attention to Response Task (SART) have been associated with GTP in one study (Ortiz de Gortari & Panagiotidi, 2023).

Moreover, it has been suggested that individuals with reduced Working Memory Capacity (WMC; which enables individuals to retain information in memory despite

distractions) are more susceptible to GTP (Llamas-Alonso, 2025; Ortiz de Gortari, Cudo, et al., 2024). However, findings are mixed, as studies using working memory tasks such as reading span and symmetry span have not consistently found associations with GTP (Ortiz de Gortari et al., 2024; Llamas-Alonso et al., 2025).

Those with higher scores of GTP have also reported maladaptive metacognitions (Ortiz de Gortari et al., 2024). Deficits in metacognition[1] (Lefebvre-Pinard, 1983) have been associated with uncontrollable worry, the production and maintenance of distressing hallucinations (Wells & Cartwright-Hatton, 2004) and emotional problems (Hagen et al., 2017).

Individuals with poor impulse control may be more likely to act on objects automatically associated with the game; therefore, impulse control has been investigated in the context of GTP. Motor impulsivity (Llamas-Alonso et al., 2025) and self-control concerning goal maintenance, inhibition, and adjournment have been demonstrated to be associated with GTP (Cudo & Zabielska-Mendyk, 2022). Although no correlations have been found between GTP and the Go/No-Go (GNG) task (Ortiz de Gortari & Panagiotidi, 2023a).

2.2.4 *Susceptibility to cognitive intrusions and sensory hypersensitivity*

GTP has been considered a subtype of a broader set of involuntary cognitions, such as semantic mind-pops and autobiographical memories (Llamas-Alonso et al., 2025). Involuntary autobiographical memories and semantic mind-pops are often components of thoughts during episodes of mind-wandering and have been correlated with GTP (Llamas-Alonso et al., 2025). Similarly, experiences such as music imagery, intrusive thoughts, hallucinations, and intrusions resulting from mobile phone usage have been also associated with GTP (Ortiz de Gortari, 2024).

Current evidence indicates that sensory sensitivity, such as increased responses to bright light, pain, and textures, is associated with GTP (Ortiz de Gortari et al., 2024). Interestingly, symptoms of HPPD, which share similarities with visual GTP experiencies, have been connected to photosensitivity and perceptual disturbances. These disturbances include sensitivity to tinnitus, migraines with aura, vertigo, and synaesthesia (McConnell et al., 2023).

2.2.5 *Underlying mental disorders*

The majority of those reporting GTP do not present a mental disorder or associated symptoms. However, individuals with a mental disorder exhibited significantly higher scores on GTP (Ortiz de Gortari, 2023). The mental health issues identified include sleep disorders (Ortiz de Gortari et al., 2016), attention-deficit/hyperactivity disorder (ADHD), dissociation symptoms as measured by the Dissociative Experiences Scale

1 Meta cognition the ability to "think about thinking" and one's ability to understand, control, and manipulate one's cognitive processes (Lefebvre-Pinard, 1983)]

(DES) (Ortiz de Gortari & Panagiotidi, 2023b), depression and anxiety (Jones-Rincon et al., 2021). Symptoms of obsessions and compulsions as measured by the Revised Padua Inventory (PI) have been observed in those with higher scores of GTP (Ortiz de Gortari, 2023).

2.2.6 *Substance use*

The use of substances has been associated with a higher intensity of GTP (Ortiz de Gortari et al., 2016). A study comparing drug users, primarily individuals who use cannabis (such as marijuana and hashish), with non-users reported that users exhibited higher scores on GTP, hallucinations, dissociative experiences, and GTP-related problems (Ortiz de Gortari, 2023b). Moreover, high alcohol consumption has emerged as a predictor of GTP (Jones-Rincon et al., 2021).

2.2.7 *Cultural influences*

It is crucial to acknowledge cultural differences in the perception of sound, image, and narration, as these factors can significantly influence the manifestation of GTP. Cross-cultural analyses indicate distinct variations between different linguistic groups. English-speaking individuals often report GTP as an internal or endogenous phenomenon, characterised by intrusive thoughts, urges, or the visualisation of video game imagery behind their eyelids. Conversely, Spanish-speaking individuals, particularly those from Latin America, tend to experience GTP as an external or exogenous phenomenon. This includes involuntary limb movements in response to external stimuli, verbal outbursts, acting out certain behaviours, and changes in behaviour while seeing images with their eyes open. Additionally, a greater number of Spanish-speaking gamers have reported experiencing distress related to GTP (Ortiz de Gortari, 2015).

3. POTENTIAL RISKS DUE TO GTP AND CLINICAL IMPLICATIONS OF GTP

GTP are prevalent among gamers and are mostly non-problematic. However, one in five gamers (20%) have experienced distress or have been socially, occupationally, or otherwise affected in their daily functioning due to GTP (Ortiz de Gortari & Griffiths, 2015). Particularly, when GTP are experienced with high frequency and in various forms the 58% reported distress and dysfunction (Ortiz de Gortari et al., 2016).

When evaluating the potential risks and clinical implications of GTP, several key factors should be considered: i) the intrusive nature of GTP, ii) the relationship between the interpretation and elaboration of GTP, and the positive appraisal that may lead to attempts to induce the phenomena, iii) the circumstances under which GTP occurs, and iv) the content of the video games involved, along with the vividness of the experience.

3.1 The intrusive nature of GTP

The intrusive nature of GTP also come into question, due to the potential of GTP to interfere with ongoing tasks, acting as a distractor when gamers get so engrossed visualising or re-playing game actions in real life context, or when game-related cues capture gamers attention and some players end acting out upon the game-cues (Ortiz de Gortari & Griffiths, 2019). For instance, some gamers have believed that they were in the game and have approached vehicles, hidden from CCTV cameras or followed different paths when walking or follow or skip game images when driving on the highway (Ortiz de Gortari & Griffiths, 2014c).

3.2 Interpretation and elaboration of GTP

The impact of experiencing GTP may depend on whether the experience is interpreted negatively or positively, which can influence mood states and lead to changes in individual behaviour. Individuals with higher resilience and a tendency to use cognitive reappraisal as emotion regulation strategy are more likely to report positive impact of GTP (Ortiz de Gortari, 2023a).

GTP has been rated as neutral to positive regarding pleasantness (Llamas-Alonso et al., 2026; Ortiz de Gortari & Diseth, 2022; Ortiz de Gortari & Griffiths, 2016a).

In terms of the negative interpretation of GTP, gamers have reported experiencing delusional thoughts, heightened states of hyper-vigilance, and irrational behaviours, such as avoidance of specific objects and places (Ortiz de Gortari & Griffiths, 2014a; Ortiz de Gortari & Griffiths, 2014c). Additionally, some individuals have expressed concerns about their mental stability. The most common reported consequences due to GTP include i) confusion and disorientation, ii) frustration, nervousness or anxiety, iii) feeling insane, iv) lost control over actions (Ortiz de Gortari, 2023). The negative interpretation of GTP is particularly relevant for gamers' mental health, as unpleasant hallucinatory experiences have been found to be a predisposing factor for schizophrenia (Budiarto et al., 2022). Comparisons have been made between the positive experiences associated with GTP and the pleasurable psychedelic experiences known as a "good trip", as some gamers have expressed a desire to induce their GTP experiences intentionally (Ortiz de Gortari & Griffiths, 2014). Mood enhancement has been reported following the GTP experience (Llamas-Alonso et al., 2026), however, the desire to induce GTP can lead to problematic behaviour. Some gamers have indicated that they extend their gaming sessions or engage in specific game modes to replicate GTP experiences (Ortiz de Gortari & Griffiths, 2014). Similarly, gamers under therapy for GD have tried to induce their GTP to revive the sensations the game causes them, as was described more specifically in the previous section discussing GTP and GD (Ortiz de Gortari & Basche, 2021).

3.3 Change of behaviours

The most significant risk associated with GTP occurs when individuals are unable to distinguish between real-life stimuli and game stimuli, leading them to respond

impulsively as if they were still in the game (Ortiz de Gortari et al., 2011; Ortiz de Gortari & Griffiths, 2014d). In some cases, automatic responses to game-related cues or sensory experiences—such as seeing images overlaid on the physical environment or hearing sounds appearing to come from various sources—can lead to automatic thoughts. However, only a small number of gamers act on these impulses (Ortiz de Gortari & Griffiths, 2014a). Those with lower impulse control may face more challenges with this form of GTP, which can be particularly dangerous in compromised situations, such as driving (Ortiz de Gortari & Griffiths, 2014a).

3.4 Circumstances of the occurrence

Two conditions have been identified under which GTP occurs (Ortiz de Gortari & Griffiths, 2016). The first condition is during periods of wakefulness, where certain contexts, such as driving, GTP can act as dangerous distractions manifesting as thoughts, impulses, behaviours, as well as sensory perceptions and distortions (Ortiz de Gortari & Griffiths, 2014d).

The second condition occurs during periods of passivity or while trying to fall asleep, which can result in sleep deprivation. Under this condition, individuals typically experience visual or auditory cues that can become disturbing, especially when they last for prolonged periods of time (Ortiz de Gortari & Griffiths, 2014c).

3.5 The content of the video games and the vividness of the experience

Video games with scary and violent content tend to generate similar feelings when they are transferred to everyday contexts and therefore can result in more aversive experiences (Ortiz de Gortari et al., 2011).

Vividness is a factor that can contribute to the risks of GTP, because when the sensory perception appears to be so clear or interpreted as real, some gamers have been close to act upon what they see or hear. Furthermore, the content of GTP has been found to be consistent both within the game itself and in response to stimuli associated with the game context (Llamas-Alonso et al., 2026).

3.6 Risk assessment of GTP

GTP is not classified as a disorder. However, the interplay between the symptomatology of GD and GTP has prompted some clinicians to incorporate GTP assessments into their clinical practices (Basche & Ortiz de Gortari, 2023a). GTP has also been recognized as a relevant construct in recent psychological models of problematic gaming (Giardina et al., 2024). Therefore, this section contains a risk assessment guide for GTP. Risk assessment encompasses the identification and description of factors that increase the likelihood of risks, trigger them, sustain them, and provide protection against them. It also entails formulating a strategy to address and manage these identified risks.

The following questions are important to assess the potential risk of GTP:

1. **How is the GTP experience manifesting, and in which location is the game content perceived?**

- GTP manifests as sensory disturbances, automatic thoughts or automatic actions.
- The location of GTP can be experienced as either endogenous or exogenous, with different impacts. Endogenous forms of GTP are experienced similarly to having a tune repetitively replaying in one's mind or visualising images that appear with each blink of the eye. Such experiences can be intrusive and may provoke anxiety or sleep deprivation, as the associated sensory content can persist for extended periods, ranging from minutes to hours. In contrast, exogenous forms of GTP involve the perception of images superimposed on objects and can be perceived as hallucinations. These experiences may elicit automatic responses, particularly among gamers, who might feel an urge to act upon these images or may even engage in behaviours directly influenced by them.

2. **How does the individual appraise and act upon the experience?**

- If the GTP experience are considered normal, aversive, pleasurable, neutral or as an indication of mental illness.
- If the individual responds toward what they are seeing, hearing or feeling. Either the behaviour is impulsive (e.g., acting upon the sensory perception or the object associated with the game), or the individual is passive and contemplative.
- If the individual attempts to change their behavior to reduce the phenomenon, or seeks to enjoy and induce it.
- If the individual chooses to share the experience with others or attempts to conceal it due to feelings of shame regarding having experienced it.

3. **What is the content of GTP?**

- If the content is neutral, like with puzzle games, realistic or fantastic, or is aversive, such as violent content or content that can represent a risk.

4. **How long does an episode of GTP last?**

- If the manifestation occurs episodically, how long do the episodes last?

5. **What is the impact of GTP on individual functionality?**

- Does the experience impair an individual's functionality when the interruptions occur, capturing their attention and leading to varying levels of distraction from ongoing tasks?
- Do individuals begin to engage in behaviours to avoid the intrusions or to induce the phenomena?

4. COMPARISON BETWEEN GTP AND SYMPTOMS OF MENTAL DISORDERS

The involuntary and uncontrollable nature of GTP resembles the signs and symptoms of mental disorders (Ortiz de Gortari, 2019). These manifestations can include intrusive thoughts, irrational reasoning, and jumping to conclusions. Additionally, individuals may experience perceptual disturbances such as hallucinations, afterimages, perceptual distortions, and dissociative states, where gamers become detached from reality, often triggered by source monitoring errors (Ortiz de Gortari & Diseth, 2022). However, determining when and how experiencing GTP can turn into a genuine disorder provoking significant distress and clinical dysfunction is still a question for investigation (Basche & Ortiz de Gortari, 2023a; Ortiz de Gortari, 2023a).

It is important to note that while GTP may resemble signs and symptoms of mental disorders, its manifestation does not necessarily fulfil the same function as symptoms of a specific disorder. For instance, compulsion serves to relieve anxiety triggered by obsessive thoughts(Yin et al., 2023). In contrast, in the case of GTP, impulsive behaviours toward game-related cues may be explained by conditioning responses. Still, they can also involve relief of anxiety when unable to play or preoccupation about gaming (Ortiz de Gortari & Basche, 2022). In this sense, GTP could be considered in a transdiagnostic manner, as its manifestation can mimic symptoms of different disorders and serve various functions (Ortiz de Gortari, 2019). (See Table 1 for details on mental disorders that share some characteristics with GTP).

Table 1. *Identified mental disorders that share some characteristics with GTP.*

Mental disorder	Symptoms	GTP
General anxiety disorder	Intrusive thoughts.	Intrusive thoughts about the game. Regretting losses, planning next session, replaying moves.
Obsessive-compulsive disorder	Obsessions.	Recurrent thoughts about the game.
	Compulsive behaviours: observable or internal.	Impulsive actions toward game-related cues. Stereotypical mental replays of the game.
Schizophrenia	Positive symptoms, e.g., hallucinations and delusions, Disorganised symptoms, e.g., including thought disorder and bizarre behaviours Negative symptoms, e.g., alogia, apathy, and amotivation.	Perceiving images, sounds, music or voices externalised. Visual and auditory misperceptions.

Mental disorder	Symptoms	GTP
Hallucinogen persistent perceptual disorder (HPPD)	Perceptual disturbances: afterimages, distortions, halos around objects, pixelations.	Perceptual disturbances of objects and environments, retinal sensations of prolonged duration, see objects pixelated, halos, and shadows around objects.
Substance use and addictive disorders	Cravings.	Recurrent imaginary, sounds, and sensations that keep the game alive in the players' minds.
	Selective attention toward cues related to the substance.	Selective attention toward game-related cues.
	Poor impulse control.	Executing actions and behaviours towards game-related cues.
Dissociative disorder	Detachment from reality, body distortions, and in general, perceptual disturbances, e.g., feeling as if time is slowing down, macropsia, alteration in sensory-motor functioning, such as analgesia, paralysis, abnormal gait, or limb posturing, tremor, or abnormal movements.	Vestibular adaptation, sensations that the body changes in size or form, moving as in the video game, e.g., strafing, involuntary movements of limbs.
	Sensations of unreality such as derealisation and depersonalisation.	Sensations of unreality, such as derealisation and depersonalisation, toward game-related cues.
		Source monitoring errors.

4.1 Psychosis and GTP

The use of media has been identified as a risk factor for psychotic experiences (Paquin, Ferrari, et al., 2024; Paquin, Philippe, et al., 2024), particularly texting and playing video games online (Hein et al., 2024). Individuals with a tendency for higher levels of digital media use also tended to higher levels of psychotic experiences (Paquin, Philippe, et al., 2024).

Psychosis is characterised by the presence of hallucinations (i.e., false sensory perceptions) and/or delusions, which result in a compromised ability to distinguish between reality and illusion (i.e., intense beliefs that influence distorted interpretations of reality). (Van Os et al., 2009).

Parallels between symptoms of psychosis and GTP have been established (Le et al., 2023; Ortiz de Gortari & Basche, 2021).

Clinical observations have indicated that experiencing a high frequency of GTP may be a risk factor for schizophrenia and could precede the onset of psychotic symptoms in vulnerable individuals (Le et al., 2023; Ortiz de Gortari & Basche, 2021). The co-occurrence of GTP with positive symptoms such as hallucinations and delusions has been observed in patients diagnosed with schizophrenia, highlighting the importance of establishing precise and differential diagnoses (Le et al., 2023; Ortiz de Gortari & Basche, 2021).

Current research indicates the following evidence:

1. Gamers have reported experiencing vivid images and sounds from the game, such as seeing icons hovering over people's heads and hearing voices that seem to come from game-related cues (Ortiz de Gortari et al., 2011).
2. In general, gamers understand that the sensory intrusions are not real, allowing them to maintain a sense of reality. However, there are occasions when these experiences cause individuals to act as if the game elements were part of the real world, indicating a disconnection from reality. Moreover, gamers have reported experiencing thoughts or ideas that may seem irrational and could qualify as persecutory ideation and magical thinking when outside the game's context and have struggled to distinguish what is real (Ortiz de Gortari & Griffiths, 2014d).
3. Various factors relevant for psychosis have also been observed in GTP. For example, vulnerability to cognitive and sensory intrusions, including hallucinations, music imagery, intrusive thoughts, unusual sleep experiences (Ortiz de Gortari, 2024); sensitivity to light, smells, or textures has also been observed among those susceptible to GTP (Ortiz de Gortari, Edwards, et al., 2024); cognitive errors (e.g., lapses in attention, cognitive failures due to memory and attention) (Ortiz de Gortari & Panagiotidi, 2023a) and positive schizotypal traits[2] (Llamas-Alonso et al., 2025).

4.2 Dissociation and GTP

The distinction between everyday or non-pathological dissociation and clinically significant dissociative symptoms is important. The same applies to problematic versus non-problematic experiences of GTP (Ortiz de Gortari & Griffiths, 2019). Every day dissociations may include instances of mind-wandering, task-unrelated thoughts, deep absorption in activities such as reading, watching a movie, or engaging in imaginative play (Butler, 2006). Immersion in virtual worlds can trigger dissociative states, like trance, leading to reduced awareness of surroundings and unresponsiveness to stimuli (Aardema et al., 2010). This process begins with interacting with virtual features and embodying virtual entities, often leading to a loss of temporal and physical awareness (Waltemate et al., 2018). On the other hand, dissociative symptoms can disrupt the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behaviour (Lyssenko et al., 2018). Dissociative disorders manifesting as depersonalisation/derealisation consist in a persistent feeling like being a stranger to yourself and/or your surroundings.

GTP has been associated with problematic dissociative experiences, and related phenomena such as fantasy proneness, daydreaming, and mind-wandering (Llamas-Alonso et al., 2025; Ortiz de Gortari & Gackenbach, 2021; Ortiz de Gortari, et al., 2016).

2 Schizotypy denotes a phenotypic representation of susceptibility to schizophrenia, encompassing subtle yet clinically relevant abnormalities in cognition, affect, perception, and social functioning (Nelson et al., 2013).

Dissociation in the context of GTP can be seen in two ways: 1) GTP involving dissociative-like symptoms, 2) GTP manifestations leading to dissociative-like states. The following section describes the differences.

4.2.1 *GTP involving dissociations*

Dissociations have been systematically examined in GTP using the multidimensional scale (GTP-MDS), which includes a specific dimension for assessing dissociations. In a study involving 1,301 gamers, participants reported episodes of suspension of reality when experiencing feelings like they were a character in the game (37%) or felt like they were still in the game environment (28%). They also reported perceiving distortions of velocity or time (22%) and experiencing body distortions, such as feeling heavier, lighter, bigger, or smaller (13%). A small number (9%) reported being unable to move, speak, or respond verbally due to being stuck in the mindset of a video game, similar to a catatonic state (Ortiz de Gortari & Diseth, 2022).

It is important to note that many of the altered perceptions that arise from virtual immersion are explain by neural adaptation processes. This includes vestibular adaptations related to autoscopy. A prime example is the sensation of "feeling body movement after playing," which describes the illusion of whole-body self-motion experienced after gaming. This phenomenon typically occurs when individuals are trying to fall asleep and can be explained by vestibular neural adaptations similar to those observed in Mal de Débarquement syndrome[3].

Another commonly reported altered perception involves the impression that objects are levitating or expanding, particularly when players glance away from the screen after engaging in dance or music games. This sensation can be attributed to motion aftereffects akin to those experienced after watching a waterfall. Moreover, immersion in virtual reality (VR) —especially when wearing VR headsets— can override cognitive expectations through bottom-up perceptual mechanisms, leading to illusions of body ownership transfer. Additionally, acute dissociative symptoms can be induced through VR immersion as well (Toronto, 2009; Van Heugten-van der Kloet et al., 2018).

4.2.2 *GTP leading to absentmindedness and dissociative like-states*

GTP can involve absentmindedness or disruptions in ongoing behaviours when memories or sensations intrude gamers' lives (Ortiz de Gortari & Panagiotidi, 2023). Additionally, false expectations or jumping to conclusions can be triggered by game-related cues, leading to actions taken without awareness in more extreme cases (Ortiz de Gortari & Griffiths, 2014).

3 Mal de Débarquement syndrome is a condition marked by oscillatory vertigo that arises after exposure to passive motion, commonly felt after trips on boats, airplanes, or extended car journeys (Kinkhabwala et al., 2023).

Sensory intrusions with game content can be intrusive enough to promote dissociative-like states. In summary, GTP can lead to absentmindedness and dissociative-like states due to the following:

1. Automatic responses to game-related stimuli can arise from two primary mechanisms. First, there are sensory and perceptual intrusions involving game elements, which typically manifest externally. Examples include the observation of game-related images in one's peripheral vision or the perception of sounds that appear to originate from objects or seemingly from nowhere. Second, there can be misinterpretations or confusions regarding objects and events associated with the game. These elements may serve as conditioned stimuli capable of eliciting conditioned responses that are often impulsive and predominantly emotional. Consequently, such responses can culminate in dissociative reactions, characterised by sensations or feelings of continued presence within the game, along with impulsive actions taken without conscious awareness of the game.
2. The engagement in automatic cognitive processes associated with gaming typically involves repetitive mental rehearsal of gameplay elements that can result in episodic absentmindedness. This can manifest as searching for patterns, scanning for in-game objects, and applying game-related strategies in real-life contexts. In more extreme instances, perseverative mental states can occur where the individual becomes fixated on game-related thoughts. Game-related thoughts can be very intrusive, diminishing cognitive flexibility and complicating the transition from virtual tasks to real-life responsibilities.
3. Engagement with vivid imagery from a game can lead to experiences that extend beyond mere thoughts and imagination. Gamers often encounter visual sensations lasting for a significant duration of time, particularly when they close their eyes and feel as though they are replaying the game. This phenomenon, referred to as closed-eye hallucinations, may also include accompanying auditory sensations. Such experiences typically arise not only in the liminal state between wakefulness and sleep, known as hypnagogia, but also during periods of full wakefulness, termed parahypnagogia. These episodes can sometimes result in moments of absentmindedness.

4.3 GTP and substance use disorders

Gamers who tend to report GTP are not under the influence of substances (e.g., medication, psychoactive substances) during their experiences, as the GTP scale specifically instructs participants to report GTP only when not under the influence of such substances (Cudo et al., 2022; Dindar & Ortiz de Gortari, 2017; Ortiz de Gortari & Diseth, 2022).

When analysing GTP in the context of addictive disorders, it is essential to distinguish between substance use disorders and substance-induced disorders. Substance use disorders arise from prolonged engagement with a substance. In contrast, substance-induced disorders —including conditions such as intoxication and withdrawal— are a

direct result of the immediate effects of these substances (Torrens et al., 2011). For example, substance-induced psychotic disorder is characterised by the presence of hallucinations and delusions that occur within one month of substance use or during withdrawal from illicit drugs, medications, or alcohol (Wilson et al., 2018). In this sense, GTP can be considered a lingering or side-effect of the exposure or practice of video games. In an episode of the TV series "CSI: Cyber" a case where a gamer jumped from a roof because he believed he could do so, just like in a video game. The show argued that the behaviour was a result of being "under the influence of GTP" and suggested that someone could sell a pill for it (Ortiz de Gortari, 2016). Withdrawal symptoms in substance addictions, as a specific manifestation of GTP, can involve perceptual disturbances, such as hallucinations, while maintaining intact reality testing.

Additionally, withdrawal symptoms may also encompass involuntary muscle movements and repetitive motions (dystonia/dyskinesia) caused by dopamine receptor-blocking agents (neuroleptics). Moreover, changes in memory and attention, irrational thinking, and false expectations could be cognitive characteristics of withdrawal (Kaptsis et al., 2016).

In terms of GTP, manifestation closed-related to withdrawal symptoms include irrational thinking and false expectations when source monitoring errors occur between the game and the real world and repetitive body movement like tapping (Ortiz de Gortari & Griffiths, 2014).Clinical similarities have also been observed between GTP and Flashbacks (FB or Type I), as well as Hallucinogen Persisting Perception Disorder (HPPD or Type II) (Ortiz de Gortari, Cudo, et al., 2024; Ortiz de Gortari & Laroi, 2018), which are associated with the use of psychedelics and consciousness-expanding substances. Perceptual disturbances in HPPD occur after the effects of the drugs have worn off. In this case, the perceptual disturbances are seen as secondary effects of using psychedelics, and they are only considered a disorder when they cause distress and dysfunction (Lerner et al., 2013).

4.4 GTP and Gaming disorder

The literature on GTP and GD delineates both their distinct characteristics and the factors they share. GD is characterised by excessive, uncontrollable, and dysfunctional gaming, while GTP involves transient changes in perceptions, cognition, and sense of agency (Ortiz de Gortari & Gackenbach, 2021).

Multiple cross-sectional studies have identified associations between GD and GTP, and GD has emerged as a predictor of GTP (Cudo & Zabielska-Mendyk, 2022; Llamas-Alonso et al., 2025; Ortiz de Gortari & Panagiotidi, 2023a; Ortiz de Gortari & Gackenbach, 2021; Zabielska-Mendyk & Cudo, 2022b). However, one longitudinal study found that the relationship between the GTP and GD is more complex than previously understood as GTP was not associated within person level with GD in any of the two waves, but exhibited a positive correlation with GD at between person level, suggesting that mediating variables may explain the observed results (Cudo et al., 2024).

The knowledge on common factors shared by GTP and GD can be summarised as follows:

- The co-occurrence of GD and mental disorders is common. In contrast, most gamers who have experienced GTP do not have a mental disorder (Ortiz de Gortari & Griffiths, 2016a). However, individuals with a mental disorder appear to be more susceptible to GTP, especially when GTP manifests intensively (Ortiz de Gortari, 2023; Ortiz de Gortari et al., 2016).
- Both GTP and GD have been linked to a range of conditions, including anxiety and depressive disorders, impulsivity, ADHD, OCD, and dissociative disorders (Jones-Rincon et al., 2021; Llamas-Alonso et al., 2025; Ortiz de Gortari & Panagiotidi, 2023b).
- Personality traits are shared among individuals experiencing GTP and those exhibiting GD symptoms. These include: neuroticism, schizotypal personality traits (Fekih-Romdhane et al., 2023; Ortiz de Gortari & Gackenbach, 2021). Furthermore, a mediation analysis showed that the association between GD and GTP is partially mediated by positive schizotypal traits and frequency of mind-pops (Llamas-Alonso et al., 2025).
- Both GTP and GD have been found to be associated with the amount of time spent playing video games (Llamas-Alonso et al., 2025; Ortiz de Gortari & Panagiotidi, 2023). However, comparative studies suggest that individuals who meet the criteria for GD tend to report significantly more time spent playing in comparison to those who have only experienced GTP (Ortiz de Gortari, 2023b; Ortiz de Gortari & Gackenbach, 2021). Conversely, in the context of GTP, individual factors such as attention failures that increase susceptibility to intrusions appear to be more significant than playing time (Llamas-Alonso et al., 2025; Ortiz de Gortari & Panagiotidi, 2023a). Moreover, poor sleep habits related to gaming have been found to partly mediate the connection between GTP and GD, indicating the importance of gaming behaviour in this link (Ortiz de Gortari & Panagiotidi, 2023).
- Substance use and alcohol consumption have both been associated with GD and GTP to a certain extent (Ortiz de Gortari, 2023).
- Gamers classified as "highly emotional and problematic" score considerably higher on indicators of gaming and gambling disorders (i.e., IGD, G-SAS) in comparison to other groups. This profile is marked by increased gaming time per week, elevated scores on GTP, negative views on loot box games, and challenges with emotional regulation. These emotional regulation issues manifest as difficulties in pursuing goal-directed activities when distressed and in managing aggressive impulses (Gonzalez-Nuevo Vazquez et al., 2024).
- Research has demonstrated that GTP serves as a mediator in the relationship between gaming motivations, game features, and the occurrence of problematic gaming (Zabielska-Mendyk & Cudo, 2022).

4.4.1 *GTP as contributor in the maintenance of GD*

GTP manifestations can be viewed as contributing to the maintenance of GD symptoms or as indicative of GD symptomatology (Basche & Ortiz de Gortari, 2023). According to clinical cases, addressing GTP in the treatment of GD is crucial for managing symptoms and establishing differential diagnoses when encountering psychotic symptoms involving game content (Basche & Ortiz de Gortari, 2023b; Le et al., 2023).

Clinical cases provide evidence of the influence of GTP on symptom maintenance in GD. For example, there is the case of a gamer who compulsively showers to prolong the gaming experience by eliciting visual sensations in the shower (Ortiz de Gortari & Basche, 2021; Ortiz de Gortari & Basche, 2022). Another case involves a patient experiencing visual elements from a game, such as afterimages, when transitioning from a dark to a well-lit room, leading to a desire to continue playing. Additionally, another patient mistakes a sound in their house for the victory sound in the game, resulting in a rush of excitement and a strong desire to sustain that feeling (Basche & Ortiz de Gortari, 2023).

Craving has received comparatively less attention in the symptomatology of gambling disorder than in substance use disorders. However, research on GTP suggests that it is highly relevant, especially when video game playing directly exposes gamers to sensory stimuli (Basche & Ortiz de Gortari, 2023). According to the Elaborated Intrusion Theory (EIT) (May et al., 2015), which is crucial in the study of cravings, the initial urge to engage in addictive behaviours can evolve from spontaneous intrusions (cognitive or sensory) to strong desires when elaborated. Key craving symptoms include multisensory imagery (taste, smell), intrusive thoughts, and urges (Aslan et al., 2023). On the other hand, various methods for interfering with or mitigating craving have been developed, including engaging in cognitively demanding tasks or even playing games like "Tetris" to reduce the vividness and overwhelming nature of cravings (Cornil et al., 2019; Skorka-Brown et al., 2014; Skorka-Brown et al., 2015). In this context, it has been suggested that GTP may even hold therapeutic potential by substituting aversive or dysfunctional intrusions with neutral game content (Ortiz de Gortari & Griffiths, 2016).

4.4.2 *GTP as symptom of GD*

GTP experiences offer clarity regarding the timing and nature of game intrusions, which can provide valuable insights into the symptoms and signs of GD, and their impact on daily life.

Preoccupation for gaming. Intrusions can manifest as unexpected thoughts, images, or urges related to game content that may be unwanted, distressing, or disturbing, lasting for an extended period. This can include repetitive thought patterns or stereotypical thoughts focused on past mistakes or failures, excessive concern about negative outcomes, anxiety about future events, or even constructive mental rehearsal, which involves deliberately practising game strategies in one's mind (Castro-Calvo et al., 2022).

Attention bias and selective attention toward game-related cues are typically observed in addictions. Numerous experiments have investigated selective attention towards gaming or substance-related cues (Heo et al., 2024; Van Holst et al., 2012). Gamers have exhibited this phenomenon in their everyday lives, responding spontaneously to game-related cues as if they were in the game. Furthermore, game-related cues can evoke sensory experiences, such as visual, auditory, or tactile sensations.

Withdrawal symptoms. Withdrawal symptoms in GD are mainly linked to psychological mechanisms rather than physiological ones (Kaptsis et al., 2016). These symptoms typically include anxiety, mood swings, sadness, and irritability. Interestingly, in the 1990s, the psychophysiological effects of Internet use—such as the voluntary or involuntary movements of fingers while typing—and associated side effects from virtual simulators, including motion sickness and cybersickness, were initially presented as humorous withdrawal symptoms (Internet addiction criteria proposed by Ivan Goldberg on a bulletin board of PsyCom.Net, Wallis, 1997). Research on GTP have identified a variety of reports by gamers which include involuntary movements of fingers like pushing the gamepads when trying to fall asleep or when wanting to use video game elements in everyday contexts (Ortiz de Gortari, 2015a; Ortiz de Gortari & Griffiths, 2014a).

5. CONCLUSIONS

While GTP should not be considered pathological by itself, it primarily reflects heightened engagement with video games that often arises shortly after stopping play, along with susceptibility to specific elements within the game. GTP manifests in various ways and levels of intensity, revealing physiological, perceptual, and cognitive changes or alterations that should not be overlooked. These changes appear to be directly related to particular features of the game.

Maladaptive coping styles and situational stressors can exacerbate the distress associated with GTP (Ortiz de Gortari, 2023). Consequently, the manner in which individuals interpret and respond to their experiences of GTP is of paramount importance.

This chapter situates GTP within a continuum that encompasses both ordinary daily experiences and the signs and symptoms associated with distress and dysfunction in psychopathology. GTP can be so absorbing that it not only disrupts ongoing tasks but also generates sensations of unreality.

The chapter explored the classification of GTP as a potential disorder and shows its correlation with various forms of psychopathology. It delves into the interplay between GTP experiences and gaming disorder, highlighting the shared factors that may contribute to both phenomena. This examination seeks to clarify the boundaries between normative gaming experiences and those that could be considered symptomatic, thereby enriching the dialogue surrounding gaming-related mental health issues.

APPENDIX A

The GTPS-20 asses GTP in various modalities: Altered visual perceptions, altered auditory perceptions, altered body perceptions, automatic mental processes, and actions and behaviours will be measured.

Altered visual perceptions
Include mind visualisations, pseudo-hallucinatory experiences (e.g., seeing game icons above people's heads), visual adaptations (e.g., perceiving objects or environments distorted), and visual misperceptions (e.g., confusing physical objects with those in the game.

Item example: *I have seen video game images with my eyes open when I am not playing. (e.g., seeing health bars above peoples' heads or maps in the corner of the eye)*.

Altered body perceptions
Includes proprioception (e.g., sensations of body or limb movement), tactile perception (e.g., pushing buttons of gamepad), and cronoceptive perception (e.g., feeling time slow down *after playing).

Item example: *I have felt a tactile (touch) sensation associated with a game when I was not playing. (e.g., felt the sensation of pushing buttons on the gamepad under my fingers)*.

Altered auditory perceptions
Include auditory involuntary imagery (e.g., hearing auditory cues in the head), auditory hallucinations (e.g. hearing sounds coming from objects), inner speech (e.g., hearing one's own thoughts preserving features from video game character's voices), and auditory misperceptions (e.g., confusing physical sounds with those from the game).

Item of example: *I have heard a character's voice from a game when I was not playing.*

Automatic mental processes
Manifest as thoughts, urges, and automatic mental actions. These range from thoughts about the game (e.g. thinking continuously about the game) to cognitive biases (e.g. experiencing attention bias toward game-related cues, jumping to conclusions bias), and source monitoring errors (e.g., confusing what an in-game character said with what a person said).

Item of example: *I have wanted or felt the urge to do something in real life after seeing something that reminds me of the video game. (e.g., seeing red doors and wanting to break through after playing Mirror's Edge or feeling the urge to climb buildings after playing Assassin's Creed)*.

Behaviours and actions
Can range from experiencing involuntary motor activations (e.g., involuntary movements of limbs) to performing actions inspired by the video game or changes in behaviour

influenced by the video game (e.g. avoiding specific places, mimicking video game characters, having verbal outbursts).

Item of example: *I have sung, shouted or said something from a video game in real life without intending to do so*.

REFERENCES

Basche, A., & Ortiz de Gortari, A. B. (2023a). *The Impact of Game Transfer Phenomena on Cravings in IGD-ADHD in Adolescents* ICBA2023, Seoul, Korea.

Basche, A., & Ortiz de Gortari, A. B. (2023b). The Impact of Game Transfer Phenomena on Cravings in IGD-ADHD in Adolescents. *Journal of Behavioral Addiction*, *11*(1), 24.

Burkhardt, J., & Lenhard, W. (2022). A meta-analysis on the longitudinal, age-dependent effects of violent video games on aggression. *Media Psychology*, *25*(3), 499-512.

Cha, Y. H., Golding, J. F., Keshavarz, B., Furman, J., Kim, J. S., Lopez-Escamez, J. A., Magnusson, M., Yates, B. J., & Lawson, B. D. (2021). Motion sickness diagnostic criteria: Consensus Document of the Classification Committee of the Bárány Society. *Journal of vestibular research : equilibrium & orientation*, *31*(5), 327-344. https://doi.org/10.3233/ves-200005

Corlett, P. R., Murray, G. K., Honey, G. D., Aitken, M. R., Shanks, D. R., Robbins, T. W., Bullmore, E. T., Dickinson, A., & Fletcher, P. C. (2007). Disrupted prediction-error signal in psychosis: evidence for an associative account of delusions. *Brain*, *130*(9), 2387-2400.

Cornil, A., Long, J., Rothen, S., Perales, J. C., de Timary, P., & Billieux, J. (2019). The gambling craving experience questionnaire: Psychometric properties of a new scale based on the elaborated intrusion theory of desire. *Addictive Behaviors*, *95*, 110-117. https://doi.org/https://doi.org/10.1016/j.addbeh.2019.02.023

Cudo, A., & Zabielska-Mendyk, E. (2022). Relationship between self-control dimensions, emotional regulation and problematic gaming: The mediating role of the Game Transfer Phenomena. *Journal of Behavioral Addictions*, *11*, 233.

Cudo, A., Zabielska-Mendyk, E., & Ortiz de Gortari, A. B. (2022). Psychometric Assessment and Gender Invariance of the Polish Adaptation of the Game Transfer Phenomena Scale. *Advance in Cognitive Psychollogy*, *18*(1), 48-63.

Dindar, M., & de Gortari, A. B. O. (2017). Turkish validation of the Game Transfer Phenomena Scale (GTPS): Measuring altered perceptions, automatic mental processes and actions and behaviours associated with playing video games. *Telematics and Informatics*, *34*(8), 1802-1813. https://doi.org/10.1016/j.tele.2017.09.003

Dindar, M., & Ortiz de Gortari, A. B. (2017). Turkish Validation of the Game Transfer Phenomena Scale (GTPS): Measuring altered perceptions, automatic mental processes and actions and behaviours associated with playing video games. *Telematics and Informatics*, *34*(8), 1802-1813.

Dyson, B. J. (2010). She's a waterfall: Motion aftereffect and perceptual design in video games involving virtual musicianship. *Perception*, *39*(1), 131-132.

Fekih-Romdhane, F., Jahrami, H., Away, R., Trabelsi, K., Pandi-Perumal, S. R., Seeman, M. V., Hallit, S., & Cheour, M. (2023). The relationship between technology addictions and schizotypal traits: mediating roles of depression, anxiety, and stress. *BMC Psychiatry*, *23*(1), 67. https://doi.org/10.1186/s12888-023-04563-9

Fraser, C. L. (2022). Visual snow: updates on pathology. *Current neurology and neuroscience reports*, *22*(3), 209-217.

Ghibellini, R., & Meier, B. (2023). The hypnagogic state: A brief update. *Journal of Sleep Research*, *32*(1), e13719.

Gonzalez-Nuevo Vazquez, C., Ortiz de Gortari, A. B., & Bray, J. H. (2024). Emotional appraisal of loot boxes: Emotional regulation, gaming and gambling disorder and Game Transfer Phenomena. *Journal of Behavioral Addictions*, *13*, 218-218.

Giardina, A., Schimmenti, A., Starcevic, V., King, D. L., Di Blasi, M., & Billieux, J. (2024). Problematic gaming, social withdrawal, and Escapism: The Compensatory-Dissociative Online Gaming (C-DOG) model. *Computers*

In Human Behavior, *155*, 108187. https://doi.org/https://doi.org/10.1016/j.chb.2024.108187

Howes, O. D., Kambeitz, J., Kim, E., Stahl, D., Slifstein, M., Abi-Dargham, A., & Kapur, S. (2012). The nature of dopamine dysfunction in schizophrenia and what this means for treatment: meta-analysis of imaging studies. *Archives of General Psychiatry*, *69*(8), 776-786.

Jones-Rincon, A., Ortiz de Gortari, A. B., Gallegos, M. I., & Bray, J. H. (2021, 6-7 July 2021). Comparing Gaming Disorder with Game Transfer Phenomena: demographics, psychosocial, gambling and gaming factors. Cyberpsychology Section Annual Conference 2021, Virtual conference.

Kaptsis, D., King, D. L., Delfabbro, P. H., & Gradisar, M. (2016). Withdrawal symptoms in internet gaming disorder: A systematic review. *Clinical psychology review*, *43*, 58-66.

Kinkhabwala, C. M., Yuen, E., Brennan, E., Cadena, A., & Rizk, H. G. (2023). Treatment options in mal de Débarquement syndrome: a scoping review. *Otology & Neurotology*, *44*(4), e197-e203.

Le, H. K., Ortiz de Gortari, A. B., Callan, A., Poynton, D., Vecchio, D., & Chen, W. (2023). Game transfer phenomena in a clinical case with psychosis and gaming disorder. *Psychiatry International*, *4*(3), 286-296.

Lerner, A., Rudinski, D., Bor, O., & Goodman, C. (2013). Flashbacks and HPPD: A clinical-oriented concise review. *The Israel journal of psychiatry and related sciences*, *51*(4), 296-301.

Lerner, A. G., Rudinski, D., & Bor, O. (2014). Flashbacks and HPPD: a clinical-oriented concise review. *Israel Journal of Psychiatry*, *51*(4), 296.

Llamas-Alonso, J., Kvavilashvili, L., Georgiou, G., & Ortiz de Gortari, A. B. (2022). Positive schizotypy and internet gaming addiction as predictors of Game Transfer Phenomena in daily life: A diary study. *Journal of Behavioral Addictions*, *11*, 232.

Llamas-Alonso, J. C., Kvavilashvili, L., Georgiou, G., & Ortiz de Gortari, A. B. (2026). A Diary Study of Game Transfer Phenomena: Examining Their Frequency, Triggers and Correlations with Spontaneous Cognitions and Psychopathology. *International Journal of Human–Computer Interaction, 1–21*. https://doi.org/10.1080/10447318.2026.2633212

Maldonado-Murciano, L., Ortiz de Gortari, A. B., Barrios, M., Juana, G., Gómez-Benito, & Georgina, G. (2023, 11-13 July). *Validation of the Spanish version of the Game Transfer Phenomena Scale – Short Form: A preliminary study* European Congress of Methodology (EAM 2023), Ghent, Belgium.

Martinotti, G., Santacroce, R., Pettorruso, M., Montemitro, C., Spano, M. C., Lorusso, M., di Giannantonio, M., & Lerner, A. G. (2018). Hallucinogen Persisting Perception Disorder: Etiology, Clinical Features, and Therapeutic Perspectives. *Brain Sciences*, *8*(3), 47.

May, J., Kavanagh, D. J., & Andrade, J. (2015). The elaborated intrusion theory of desire: a 10-year retrospective and implications for addiction treatments. *Addictive Behaviors*, *44*, 29-34.

McConnell, A., He, W., McConnell, H., & Sowman, P. F. (2023). Associations between Hallucinogen Persisting Perception Disorder (HPPD) and non-visual perceptual disturbances.

Noya, R., & Murti, H. A. S. (2026). Crossing the Real and Virtual Worlds: Adaptation of the Transfer Phenomena Scale Game (GTPS-20). *G-Couns: Jurnal Bimbingan dan Konseling*, *10*(02), 1268-1279.

Ortiz de Gortari, A. B. (2024). Sensory and cognitive intrusions with and without media content during the COVID-19 pandemic: Isolation, media use, sleep and stress factors. *Telemat. Inf.*, *87*(C), 14. https://doi.org/10.1016/j.tele.2023.102095

Ortiz de Gortari, A. B. & Panagiotidi. (2023a). The interplay between executive function deficits, psychopathological traits and dysfunctional gaming habits in the context of Game Transfer Phenomena. *Computers In Human Behavior*, *138*, 107469. https://doi.org/https://doi.org/10.1016/j.chb.2022.107469

Ortiz de Gortari, A., B, & Griffiths, M., D. (2014a). Altered visual perception in Game Transfer Phenomena: An empirical self-report study. *International Journal of Human-Computer Interaction*, *30*(2), 95-105.

Ortiz de Gortari, A. B. (2015a). *The South Korean Ministry of Health and Welfare's campaign based on Game Transfer Phenomena experiences*. Retrieved October 5 from http://wp.me/pTBkV-NJ

Ortiz de Gortari, A. B. (2016). Game Transfer Phenomena in an episode of CSI: Cyber. http://gametransferphenomena.com/2015/05/game-transfer-phenomena-in-an-episode-of-csi-cyber/

Ortiz de Gortari, A. B. (2017). Empirical study on Game Transfer Phenomena in a location-based augmented reality game. *Telematics and Informatics*, *35*(2), 382-396.

Ortiz de Gortari, A. B. (2019). Game Transfer Phenomena: Origin, development and contributions to the videogame research field. In A. Attrill-Smith, C. Fullwood, D. Kuss, & M. Keep (Eds.), *Oxford Handbook of Cyberpsychology* (pp. 532-556). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198812746.001.0001

Ortiz de Gortari, A. B. (2023a). Coping with COVID-19 pandemic stressors: Comparisons between non-players and players, and levels of Game Transfer Phenomena. *Entertainment Computing*, *44*, 100530. https://doi.org/https://doi.org/10.1016/j.entcom.2022.100530

Ortiz de Gortari, A. B. (2023b). Gaming disorder, unusual experiences, and Game Transfer Phenomena among gamers with and without a psychiatricdiagnosis, and experience using drugs. *Journal of Behavioral Addictions*, *12*(1), 207.

Ortiz de Gortari, A. B., Aronsson, K., & Griffiths, M. D. (2011). Game Transfer Phenomena in Video Game Playing: A Qualitative Interview Study. *International Journal of Cyber Behavior, Psychology and Learning (IJCBPL)*, *1*(3), 15-33.

Ortiz de Gortari, A. B., & Basche, A. (2021). Pain and gain of auditory intrusions with video game content: Game transfer phenomena in clinical cases. *European Psychiatry*, *64*(1), S642-S642.

Ortiz de Gortari, A. B., & Basche, A. (2022). Proposed methodology for assessing Game Transfer Phenomena in clinical contexts. *Journal of Behavioral Addictions*, *11*(1), 235.

Ortiz de Gortari, A. B., & Cudo, A. (2023). Adaptation of the Game Transfer Phenomena Scale into Spanish: Sensory-Perceptual Changes, Intrusive Thoughts, and Involuntary Behaviors in Mexican Video Game Players. *Revista Internacional de Investigación en Adicciones (Pre-print)*.

Ortiz de Gortari, A. B., Cudo, A., Llamas-Alonso, J., & Lerner, A. G. (2024). Outlining theoretical underpinnings of Game Transfer Phenomena. *Annual Review of Cybertherapy and Telemedicine*.

Ortiz de Gortari, A. B., & Diseth, Å. (2022). Multidimensional assessment of Game Transfer Phenomena: Intrusive cognitions, perceptual distortions, hallucinations and dissociations [Original Research]. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.896238

Ortiz de Gortari, A. B., Diseth, Å., Styvertsen, A., & Ståle, P. (in press). A validation of a short version of the Game Transfer Phenomena Scale on mobile phone games: gaming habits, gaming motivation and gaming disorder. *Behaviour & Information Technology*.

Ortiz de Gortari, A. B., Edwards, C., & Palmer-Cooper, E. (2024). Sensory experiences during and after playing video games and watching videos with ASMR-eliciting properties. *Journal of Behavioral Addiction*.

Ortiz de Gortari, A. B., & Gackenbach, J. (2021). Game Transfer Phenomena and Problematic Interactive Media Use: Dispositional and Media Habit Factors. *Frontiers in Psychology*, *12*(1144), 585547.

Ortiz de Gortari, A. B., & Griffiths, M. D. (2014b). Auditory experiences in Game Transfer Phenomena: An empirical self-report study. *International Journal of Cyber Behavior, Psychology and Learning*, *4*(1), 59-75.

Ortiz de Gortari, A. B., & Griffiths, M. D. (2014c). Automatic Mental Processes, Automatic Actions and Behaviours in Game Transfer Phenomena: An Empirical Self-Report Study Using Online Forum Data. *International Journal of Mental Health and Addiction*, *12*(4), 432-452. https://doi.org/10.1007/s11469-014-9476-3

Ortiz de Gortari, A. B., & Griffiths, M. D. (2015). Game Transfer Phenomena and its associat-

ed factors: An exploratory empirical online survey study. *Computers In Human Behavior*, *51*, 195-202.

Ortiz de Gortari, A. B., & Griffiths, M. D. (2016). Prevalence and characteristics of Game Transfer Phenomena: A descriptive survey study. *International Journal of Human-Computer Interaction*, *32*(6), 470-480.

Ortiz de Gortari, A. B., & Griffiths, M. D. (2019). Letter to the Editor for 'Current Addiction Reports'—Game Transfer Phenomena and Dissociation: a Reply to Guglielmucci et al. (2019). *Current Addiction Reports*. https://doi.org/10.1007/s40429-019-00250-6

Ortiz de Gortari, A. B., & Laroi, F. (2018). Broadening the understanding of the psychopathology of gaming: The relation between involuntary behaviours, sensorial and cognitive intrusions with videogame content and Internet Gaming Disorder. *International Conference on Behavioral Addictions*, *7*, 24.

Ortiz de Gortari, A. B., Oldfield, B., & Griffiths, M. D. (2016). An empirical examination of factors associated with Game Transfer Phenomena severity. *Computers In Human Behavior*, *64*, 274-284.

Ortiz de Gortari, A. B., & Panagiotidi, M. (2023b). The Role of ADHD and Dissociation Symptoms in Gaming Disorder and Game Transfer Phenomena. *Australian & New Zealand Journal of Psychiatry. 57(S1), 3-198.*, *57*(S1), 3-198.

Ortiz de Gortari, A. B., Pontes, H. M., & Griffiths, M. D. (2015). The Game Transfer Phenomena Scale: An Instrument for Investigating the Nonvolitional Effects of Video Game Playing. *Cyberpsychology, Behavior, and Social Networking*, *10*(18), 588-594. https://doi.org/10.1089/cyber.2015.0221

Ortiz de Gortari, A. B. G., Mark D. (2015b). Game Transfer Phenomena and its associated factors: An exploratory empirical online survey study. *Computers In Human Behavior*, *51*, 195-202. https://doi.org/10.1016/j.chb.2015.04.060

Skorka-Brown, J., Andrade, J., & May, J. (2014). Playing 'Tetris' reduces the strength, frequency and vividness of naturally occurring cravings. *Appetite*(76), 161-165.

Skorka-Brown, J., Andrade, J., Whalley, B., & May, J. (2015). Playing Tetris decreases drug and other cravings in real world settings. *Addictive Behaviors*, *51*, 165-170.

Smahel, D., Blinka, L., & Ledabyl, O. (2008). Playing MMORPGs: Connections between addiction and identifying with a character. *Cyberpsychology & Behavior*, *11*(6), 715-718.

Stickgold, R., Malia, A., Maguire, D., Roddenberry, D., & O'Connor, M. (2000). Replaying the Game: Hypnagogic Images in Normals and Amnesics. *Science*, *290*(5490), 350-353.

Tian, M.-Y., Zhou, X.-Y., Liao, X.-Y., Gong, K., Cheng, X.-T., Qin, C., Liu, K.-Z., Chen, J., & Lei, W. (2023). Brain structural alterations in internet gaming disorder: Focus on the mesocorticolimbic dopaminergic system. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *127*, 110806. https://doi.org/https://doi.org/10.1016/j.pnpbp.2023.110806

Torrens, M., Gilchrist, G., & Domingo-Salvany, A. (2011). Psychiatric comorbidity in illicit drug users: substance-induced versus independent disorders. *Drug and alcohol dependence*, *113*(2-3), 147-156. https://doi.org/10.1016/j.drugalcdep.2010.07.013

Van der Linden, D., Frese, M., & Meijman, T. F. (2003). Mental fatigue and the control of cognitive processes: Effects on perseveration and task engagement. *Acta Psychologica*, *113*(1), 45-66.

Vis, P. J., Goudriaan, A. E., Ter Meulen, B. C., & Blom, J. D. (2021). On perception and consciousness in HPPD: A systematic review. *Frontiers in neuroscience*, *15*, 675768.

Wang, C., Ortiz de Gortari, A. B., Charles, F., & Tang, W. (2024). Assessing Game Transfer Phenomena in a Chinese population. *Journal of Behavioral Addictions*, *13*, 215.

Wilson, L., Szigeti, A., Kearney, A., & Clarke, M. (2018). Clinical characteristics of primary psychotic disorders with concurrent substance abuse and substance-induced psychotic disorders: A systematic review. *Schizophrenia Research*, *197*, 78-86.

Yates, K., Lång, U., Peters, E. M., Wigman, J. T. W., McNicholas, F., Cannon, M., DeVylder, J., Ramsay, H., Oh, H., & Kelleher, I. (2021).

Hallucinations in the general population across the adult lifespan: prevalence and psychopathologic significance. *The British Journal of Psychiatry*, *219*(6), 652-658. https://doi.org/10.1192/bjp.2021.100

Yee, N., & Bailenson, J. N. (2009). The Difference Between Being and Seeing: The Relative Contribution of Self-Perception and Priming to Behavioral Changes via Digital Self-Representation. *Media Psychology*, *12*(2), 195-209.

Yin, L., Han, F., Yu, Y., & Wang, Q. (2023). Obsession, compulsion and learning in obsessive-compulsive disorder: A multilevel computational model. *Neurocomputing*, *549*, 126461. https://doi.org/https://doi.org/10.1016/j.neucom.2023.126461

Zabielska-Mendyk, E., & Cudo, A. (2022a). Game Transfer Phenomena as a mediator between motives for gaming, game features and problematic videogame playing. Journal of Behavioural Addictions,

Zabielska-Mendyk, E., & Cudo, A. (2022b). Game Transfer Phenomena as a mediator between motives for gaming, game features and problematic videogame playing. *Journal of Behavioral Addictions*, *11*, 234.

26

MOBILE PHONE CO-PRESENCE ('PHUBBING'): INSIGHTS INTO RELATIONAL CONSEQUENCES, REASONS, AND BEHAVIOURAL ADDICTION LINKS

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ABSTRACT:

Smartphones are now essential in our daily lives, enabling leisure activities like gaming, streaming, and social media access, but also daily task management. This constant connectivity, however, often intersects with face-to-face interactions, resulting in co-present mobile phone use, a behaviour known in scholar discourse as 'phubbing'. Interdisciplinary research, including psychology and communication studies, has focused on understanding the intricate factors involved in managing both virtual and face-to-face interactions. In this chapter, we explore co-present mobile phone use, define it, examine research within specific dyads, explore reasons behind such usage, and investigate its connection to behavioural addictions. Our research synthesis reveals that the impact of co-present phone use varies among different relational types, largely due to differing relational nature and interpersonal dynamics. Reasons for phone use range from individual trait-like characteristics to contextual factors and could also be partially explained by the relationship type. Additionally, we explore co-present phone use in the context of behavioural addiction, recognising the behaviour's complexity beyond a simplistic addiction model. The chapter ends with a summary and recommendations for future research.

KEYWORDS:

problematic smartphone use, phubbing, technoference, co-present mobile phone use, social interactions

"An important technological innovation is not usefully thought of as a unitary cause eliciting a series of discrete effects. Instead, it can be seen as an alteration of the material horizon of our world, with transformative implications for both the contours and the interior texture of our lives. Technology makes the world a new place".

Shoshana Zuboff, *In the Age of the Smart Machine: The Future of Work and Power* (p.388)

1. INTRODUCTION

Mobile devices have become integral to our daily lives, with smartphones being the most prominent. Mobile phones[1], initially limited to calls, SMS, and basic games, have evolved into smartphones, versatile tools for managing nearly all tasks. They facilitate quick online communication, efficient task navigation, and management of household and work functions, such as finances and smart devices (e.g., smart home hubs). Smartphones also facilitate leisure activities, including games, streaming, and access to social media. This immediate access to the *richness* of the external digital network in the form of a smartphone provides users with the sense of being always connected, to be accessible at all times and places. Inevitably, this non-stop connectivity overlaps with immediate social interactions with physically co-present others, potentially violating social norms by using the phones in inappropriate settings such as classes, work meetings, quality time with partner/child/friend, etc. This concern was reflected in early scientific publications, referring to the use of mobile devices around co-present others as the "abuse" and "trouble of our age" (Karadağ et al., 2016; Ugur & Koc, 2015).

The need to understand the complex factors involved in managing both virtual and physical interactions has drawn attention from interdisciplinary research, such as psychology and science communication. The present chapter will provide an overview and discussion of studies covering co-present mobile phone use. The goals of this chapter are: (1) to define co-present mobile phone use; (2) to examine the research on co-present mobile use in specific dyads; (3) to explore reasons for co-present mobile phone use; and (4) to investigate how these reasons relate to behavioural addictions.

1 We interchange the terms "smartphone" and "mobile phone", though they have been differentiated before (Harris et al., 2020).

2. MOBILE PHONE PRESENCE IN INTERACTIONS

Concerns about phone intrusiveness in face-to-face interactions date back to the popularisation of landline telephones in homes during the latter half of the 20th century. Even then, these phones could interrupt key social moments, such as family meals (de Sola Pool, 1977; Lacohée & Anderson, 2001). As phones became more mobile and popular, with there being approximately 5 billion mobile phone users worldwide (International Telecommunications Union, 2010), their intrusive potential increased further. The release of the first touchscreen smartphones in 2007 with a GPS, camera, and instant internet access, was a turning point for the industry. Towards the end of the first decade of the third millennium, the mobile phone had started to be seen as a necessity (Ling, 2012). At that point, academics had already remarked that the presence of mobile devices in daily lives was changing the social landscape (e.g., Humphreys, 2005). Using mobile devices in the presence of others was shown to be very common: Vanden Abeele and colleagues (2019) reported that phones were used by at least one interlocutor in more than 60% of observed dyadic conversations. Based on phones' intrusive potential, researchers started to explore potential negative effects that phone use may have on interactions and relationships.

Communication scientists have suggested that a phone user may be physically present but mentally absent (Fortunati, 2002; Gergen, 2002). Research shows that this mental absence negatively impacts social interactions for both people involved. When someone uses a mobile phone during a conversation, it can be seen as breaking social rules. Fortunati (2002) argues that using a mobile phone in the presence of another person reflects a choice between physical and psychological spaces of intimacy with one's network. Engaging with a mobile phone signifies 'being somewhere else' in an immaterial space, making the physical space just a background. Thus, when attention is directed at the phone, the flow of interaction is expected to collapse and temporarily suspend (Turkle, 2011).

To better understand negative effects of co-present phone use, researchers have drawn from classic contributions on non-verbal communication. Albert Mehrabian's (1972) work suggests that more than 90% of interpersonal communication is non-verbal, relying on intonation and body language of interlocutors. Certain non-verbal behaviours, such as distance, eye contact, and body orientation, are important in recognising interpersonal attitudes and engagement. Vanden Abeele (2020) argues that the co-present use of smartphones prevents speakers from establishing interactional engagement due to averted eye gaze and non-forward-leaning body posture (see also Wirth et al., 2010). Research has since established that indeed smartphone use in co-present interactions may hurt social interactions (Chotpitayasunondh & Douglas, 2018). This aligned with empirical evidence that co-present smartphone use may harm social interactions by signalling disinterest and disengagement (Miller-Ott & Kelly, 2017) and violating behavioural expectations (e.g., Hall et al., 2014).

The discourse around co-present mobile phone use and its consequences grew significantly in the 2010s, largely due to the 2013 Stop Phubbing social campaign organised by Macquarie Dictionary Publishers. The objective of this campaign was to raise awareness of and reduce the social practice of looking at one's phone instead of paying attention to the interaction partner. The campaign coined the term phubbing, a composition of words 'phone' and 'snubbing'. Since then, research on phubbing has grown, with 249 academic publications featuring the term since 2015[2]. This trend highlights the scholarly recognition of phubbing as a relevant social science subfield.

Phubbing has sparked extensive empirical research across various disciplines, broadening the understanding of its associated factors. Most studies focus on the consequences of phubbing in interactions and its impact on interpersonal relationships. This emphasis stems from the phenomenon's conceptualization and its inherently negative connotations (Cummings & Reimer, 2021). Alongside "phubbing," the term "technoference" (a blend of "technology" and "interference") has gained popularity, addressing the general interruptions caused by technology in daily life, particularly within families (McDaniel & Coyne, 2016). Both terms, products of word merging, highlight the direct harmful effects of co-present phone or technology use, implying that these actions inherently cause negative outcomes (Frackowiak, Ochs, et al., 2024). Consequently, the study of these harmful effects has garnered significant attention from researchers.

In the present chapter, we largely adhere to the term "co-present mobile phone use", though we also refer to the terminology used by the researchers, most of them referring to the behaviour as "phubbing" (e.g., Chotpitayasunondh & Douglas, 2016), some using "technoference" (e.g., McDaniel & Coyne, 2016)[3].

3. STUDIES ON CO-PRESENT MOBILE PHONE USE ACROSS POPULATIONS

Most research on co-present phone use concentrates on how it may impact dyads rather than groups (though it does not necessarily mean that dyads are always recruited in such research[4]). Dyadic interactions allow for deeper intimacy due to the focused attention

2 Search conducted in April 2024 using the Web of Science Core Collection.

3 We are aware of the ongoing debates around the problematic use of terminology when referring to technology-related behaviours. Researchers have debated what constitutes the nature of "phubbing", and whether *any* co-present use of the mobile device warrants the label, or whether the experience of 'feeling ignored' is *inseparable* from the term (McEwan, 2024). The problem is also reflected in operationalizations measuring the behaviour (Frackowiak, Ochs, et al., 2024). However, even though we wanted to flag those methodological and conceptual shortcomings to the readers, they are not covered in this chapter.

4 It has been flagged as a shortcoming of existing research, because ignoring the dyadic structure dismisses the interdependence that two individuals have on one another, regardless of the nature of the dyad (Brauer & Proyer, 2019; Denecker et al., 2024). It is worth noting that most of the co-present

and personal connection between two interlocutors, unlike group interactions, where flexible group dynamics dominate (Solomon et al., 2021). In a dyadic interaction, two co-present interlocutors are expected to focus on each other, hence the impact of phone use may be more pronounced than in a group (Vanden Abeele, 2020). Researchers have tackled the study of co-present smartphone use across different dyads, such as romantic partners, boss-employee, parent-child, or friends. Smartphone use in the presence of others may signal to others that they don't have the full attention of the smartphone user (Vanden Abeele et al., 2024). What this lack of attention means to the person that is being ignored depends on the context and the relationship with the user. The following subsections show how co-present phone use affects each of these dyads.

3.1 Parent-child

Parental use of technological devices in the presence of children has attracted the most attention in terms of phubbing/technoference research due to its potential for far-reaching consequences. Specifically, it may impact early childhood experiences and the child's bond with their caregiver, conceivably influencing life course development (Sroufe, 2005).

Parental smartphone use in the presence of children is a common phenomenon. Some researchers have employed naturalistic observation methodologies in public settings where parents tend to their children. For example, studies observing parents with their children in a restaurant (Radesky et al., 2014) and during playtime (McDaniel & Coyne, 2016) found that most parents used their phones. Hiniker et al. (2015) reported that over a third of caregivers spend more than a fifth of their time with their child on their phones.

The prevalence of this behaviour was deemed concerning, due to its potential to lead to distracted parenting. Indeed, parents are five times less likely to respond to their child's call for attention when using a phone, compared to when not using it (Vanden Abeele et al., 2020). This may impact parental sensitivity to their children's needs. Wolfers et al. (2020) revealed that 43 of 89 observed mothers used their smartphone on playgrounds and that the duration of phone use negatively predicted maternal sensitivity. Parents have equally reported across studies that smartphone use had negative effects on their parenting. As per one of the studies, they reported feeling more distracted and less connected to their children (Kushlev & Dunn, 2019), and in another their inability to accurately interpret and respond to their child's cues and needs when using their mobile device (Radesky et al., 2016).

When considering children's socio-cognitive development, co-present mobile use may have more serious and long-term consequences than reducing the quality of a social interaction or even relationship. Parent-child relationship is the principal factor

phone use research did not recruit dyads. We will not cover this limitation in more details, but we would like to flag this up beforehand.

driving child development (Bowlby, 1969). Infants are sensitive to mutual gaze that can be disrupted when tending to a technological device whilst parenting. Researchers have argued that breaking off the direct eye contact could influence the baby's feelings of security and jeopardise their possibility to develop social skills (Raudaskoski et al., 2017). Looking behaviour is pertinent as infants prefer to look at faces that "engage them in mutual gaze" (Farroni et al., 2002). Lack of emotional expression manifested while using a smartphone, can provoke emotional distress in a child (Kildare, 2017). In a similar vein, expressing emotion when using a mobile phone may produce ambivalent information about caregiver's affect in relation to the baby. A baby cannot interpret multiple actions or derive correct meaning from the grown-up's attention jumps between the face-to-face situation and smartphone.

While there is great concern for infants' development, children of all ages may be affected by parental distraction due to smartphones. However, relatively few publications tackle the parental smartphone use around school-age children and adolescents. Among those studies, we learn that parents and adolescents felt more distant when a mobile device was present during the interaction (Lanette, 2018; see Knitter & Zemp, 2020 for a review of findings across age), and that adolescents felt less warmth from their parents when they engaged with their phones, which predicted anxiety, depression, and cyberbullying (Stockdale et al., 2018).

While discussions about parents using smartphones often focus on potential impacts on child development, we acknowledge the complexity of parental behaviour. We should consider the various needs that might lead parents to use their devices while caring for their children. Parents may use a phone to access information and support regarding parenting (Radesky et al., 2016). They might also use it as a tool for emotional and stress regulation (Solecki, 2020). Parents, especially mothers, have reported the need to use the phone to feel that they have a life beyond their children (Bartholomew et al., 2012; Radesky et al., 2016).

Finally, recent literature has investigated the impact of smartphone use on parents themselves. For instance, an experienced sampling study explored the role of norms and guilt around maternal smartphone use by recruiting 158 German mothers (Wolfers et al., 2023): more intense feelings of guilt around phone use predicts lower satisfaction with the mother role. In a study by McDaniel et al. (2023), most parents expressed a desire to change their smartphone use, but only a smaller proportion had taken concrete actions to do so. This highlights the gap between intention and action when it comes to modifying phone habits among parents. However, additional investigations into this topic, including parents' assessment and perception of their smartphone use around their children, are necessary.

3.2 Romantic Partners

Partners in romantic relationships are characterised by a particular level of interdependence. Given that partners often cohabit or spend significant time together, smartphone

use during daily interactions becomes unavoidable (Avgustis & Oloff, 2023; Roberts & David, 2016). Indeed, 70% of participants report that smartphones sometimes interfere with their interactions with their partners (McDaniel & Coyne, 2016). Other studies show that partners experience such behaviour from their partner daily (Carnelley et al., 2023; Frackowiak et al., 2022).

The research on co-present mobile phone use in couples has largely focused on relational outcomes such as intimacy and perceived relationship quality. Intimacy is characterised by partners providing each other with the opportunity to feel understood and accepted as they are within the relationship (Timmerman, 2009). Findings show that intimacy is negatively impacted by partner phubbing (Amichai-Hamburger & Etgar, 2016; Beukeboom & Pollmann, 2021; Halpern & Katz, 2017). Similarly, a wealth of studies shows a negative link between phubbing or technoference and perceived relationship quality (e.g., Hipp & Carlson, 2021; McDaniel & Drouin, 2019; Thomas et al., 2022).

To explain these negative effects, researchers have relied on other psychological constructs, one of them being perceived partner responsiveness, i.e., the extent to which individuals believe that their romantic partners care about, understand, and validate their thoughts and feelings (Reis et al., 2004). Several studies have shown that perceived co-present phone use by partners reduced perceived responsiveness, which, in turn, reduced reported relationship quality (e.g., Beukeboom & Pollmann, 2021; Booth et al., 2021; Frackowiak et al., 2022). However, it has been noted in the literature that the partner *can* remain responsive even with the phone in hand, though rarely has this been acknowledged. Perceiving a partner as responsive can be a mitigating factor against negative emotions experienced during partner's phone use, a recent study shows (Frackowiak, Hilpert, et al., 2024; McEwan, 2024).

Another mechanism that may impact perceived relationship quality is conflict over technology use, which may be prompted through partner's use of the device (Halpern & Katz, 2017; Roaché et al., 2020; Togar et al., 2023). To better understand how conflict over technology use unfolds, researchers have also explored how individuals communicated about the phone's presence in interactions. A study conducted in the US shows that less than half of the participants opt for direct communication strategies (e.g., asking a partner to put the phone down, reproach them, or negotiate the phone usage rules; Kelly et al., 2022). Note that the research on communication strategies employed in co-present phone use situations is scarce. The most recent study of Belgian couples indicates that, whilst conflict over own smartphone use was relatively low (below mid-scale), it was positively predicted by feeling phubbed by both husbands and wives (Denecker et al., 2024). It is worth noting that the reported conflict was reduced by years of living together, indicating the role of stability and duration of the relationship.

Nonetheless, assuming that partner's phone use always causes relational harm is uninformative (Foster Campbell, 2022). Given the extensive time that partners spend together and use technology, it is too simplistic to expect that every instance of phone use leads to the other partner feeling ignored. Some studies show that a partner's phone

use is integrated in couples' daily activities (Foster Campbell, 2022; Kelly & Miller-Ott, 2022). A recent experiment found that the mere presence of a phone did not impact romantic partners' relationship quality (Heyman & Human, 2024). An unpublished study involving partners engaged in a stress-coping interaction found that mobile phone use did not increase negative emotions (Frackowiak, 2020). This study found that positive emotions, though, increased when the phone was put down, for the person who had used it. Before that, only few publications had considered that integration of mobile phones in couples' activities can foster emotional bonding between partners (e.g., Kelly et al., 2017). Nonetheless, research on the role of smartphones in partner interactions is limited, leaving much unknown about real-time interaction dynamics.

Other authors suggest that understanding the impact of smartphone use on relationships depends on the role that smartphone's play in interactions (Cummings & Reimer, 2021). The effect of smartphone use can depend on whether it is independent or shared with the partner (Salmela et al., 2019). Adjusting phone usage and establishing implicit rules around technology use can mitigate potential conflicts (Foster Campbell, 2022). Recent research using objective smartphone use measures via logging screen time of both partners found no association between one partner's co-present smartphone use and the other partner feeling phubbed (Denecker et al., 2024). This suggests that, with evolving technology, smartphones in relational spaces may often be an ambivalent part of daily routine and background activities (Frackowiak et al., 2025). Researchers argue that enhancing our comprehension of how individuals perceive their partner's phone use would aid the development of interventions that would seek to shift the phone usage patterns towards more beneficial periods, based on partners' experiences.

3.3 Friends

As seen in the previous sections, close individuals such as family members tend to be phubbed more than strangers and acquaintances, this is also the case for close friends (Al-Saggaf & MacCulloch, 2019). This is probably because of the intimate nature of these relationships, where people feel comfortable behaving authentically (Sun & Wong, 2024). However, friends do anticipate spending time together engaging in mutual activities, conversations and sharing interests, which includes loyalty and empathic understanding (Clark & Ayers, 1993). Co-present phone use may reduce the quality of such moments, important for friendship maintenance (Wilson et al., 2015), and jeopardise the friendship.

The studies on friend phubbing are mixed. Some studies have shown that phubbing behaviour reduces friendship commitment and satisfaction for the individual doing the phubbing (e.g., Sun & Yoon, 2023). While another study showed that own phubbing was not associated with lower friendship satisfaction, but experiencing phubbing was (Stevic & Matthes, 2023). Brown et al. (2016) invited same-gender friendship pairs to a lab and observed their phone behaviour. They found that a quarter of the pairs did not use their phone, but those who did, reported lower interaction quality. Conversely, Ang et al. (2018) found that while phone obsession among Malaysian adolescents was linked

to communication disturbances, it did not affect social connectedness and belonging within their friendship groups.

Qualitative research gives further insight into how individuals feel about co-present smartphone use in the presence of their friends. In one study participants reported feeling lonely and frustrated when communicating with phubbers, because they needed to repeat themselves to be understood by their distracted friend (Ang et al., 2018). In a focus group study participants reported feeling unimportant when their friends' used a phone in their presence (Miller-Ott & Kelly, 2017). However, in another study participants reported feeling unperturbed about co-present use, because it allowed them to use their phone freely as well (Kelly et al., 2019).

Interestingly, across several of these studies participants also reported mitigating factors such as context and type of use. For instance, phone use was seen as justified if it was quick or necessary (Miller-Ott & Kelly, 2017), and more tolerable if it involved work-related activities rather than personal messaging or gaming (Kelly et al., 2019). Coping strategies may be another mitigating factor. A study (Stevic & Matthes, 2023) found that the relationship between experiencing phubbing and friendship satisfaction was more pronounced when participants had low levels of direct coping strategies (e.g., suggesting that the friend stop using the phone). However, an avoidant coping strategy intensified the association between phubbing and social isolation. Qualitative findings suggest that participants tend to opt for avoidant coping strategies when experiencing a friend's phone use: mirroring their behaviour or not saying anything to stop their friend (Kelly et al., 2019; Miller-Ott & Kelly, 2017).

Most research on friend phubbing focuses on adolescents, as smartphone ownership is highest among young adults (Pew Research Center, 2021). Researchers suggest that emerging adults often prioritise immediate gratification through technology over face-to-face interactions, leading to less coordinated conversations and reduced access to emotional cues, potentially hindering the development of mature intimacy (Brown et al., 2016). Further study is needed to understand how smartphones affect friendships across the lifespan. Given the long-term nature of close friendships, it would be valuable to explore how smartphone presence impacts their functioning. This includes how friends manage each other's behaviour, potentially developing rules, and expectations around phone use (Hall et al., 2014; Miller-Ott & Kelly, 2017). Recent discussions suggest that the concept of phubbing may evolve, necessitating a broader shift in the study of their social co-presence (Vanden Abeele, 2020).

3.4 Workplace

Phones are present in most workplaces. Approximately 20% of employers think their employees are productive for less than five hours daily, often attributing this to smartphone distractions. Additionally, over a quarter of employers' view smartphone use as detrimental to the employer-employee relationship (Farber, 2016).

Most research on phone use in the workplace has been on superiors phubbing their employees, a phenomenon known as boss or supervisor phubbing. This focus is probably because people are more likely to phub their subordinates than their supervisors (Al-Saggaf & MacCulloch, 2019). Indeed, research on boss phubbing stems from the assumptions that employees may experience psychological distress when facing inattentive and uncivil communication from their supervisor (Park et al., 2015). As expected, employees who experience being phubbed by their boss are more prone to feel less significant or capable of performing well at work, have less trust in their supervisor, and to experience social exclusion in the workplace (e.g., Roberts & David, 2017; Yasin et al., 2023).

Research on smartphone use during meetings shows that it negatively impacts how others perceive the user in terms of trustworthiness, professionalism, politeness, and competence (Piercy & Underhill, 2021). Multitasking on another device than the smartphone is not perceived as negatively, likely because other devices are perceived as more professional tools. An experiment investigating the effects of phone use by an interviewer during a job interview revealed that phubbing had negative effects on both parties. The interviewer left a bad first impression on the interviewee, and the interviewee performed worse on an arithmetic task when phubbed compared to when not phubbed (Ochs et al., 2025).

Overall, existing studies offer limited insight into smartphones' impact on workplace dynamics. Most research focuses on boss phubbing, with little discussion on power dynamics or contextual factors. Additionally, no studies have examined how bosses evaluate their own technology habits. A recent qualitative analysis explored reactions to being phubbed during job interviews (Ochs et al., 2025), revealing negative emotions, and complaints (e.g., feeling devalued and annoyed), as well as coping strategies. Two types of coping behaviours were identified: action-oriented (e.g., addressing the phubber) and rationalisation-based (e.g., finding a reasonable explanation). These findings highlight the complexity of phubbing in the workplace and suggest the need for further research on co-present mobile phone use and coping strategies.

3.5 Note on Measurement

It is worth mentioning how the prominence of co-present phone use in the populations above has been measured. The common practice in cross-sectional research is to use an aggregated score of a validated instrument to indicate the extent to which phubbing or technoference is prominent and correlate it with other variables or use it as a predictor in a regression. The most commonly used instruments are Generic Scale of Phubbing and Being Phubbed (GSP/GSBP; Chotpitayasunondh & Douglas, 2018), Partner Phubbing Scale (PPS; Roberts & David, 2016), Phubbing Scale (Karadağ et al., 2015), and Technoference in Life Examples Scale (TILES; McDaniel & Coyne, 2016). Note that researchers have also used self-devised or single-item instruments (e.g., Frackowiak et al., 2022; Zoppolat et al., 2022). The hitherto applied operationalizations

have been subject to debates in recent publications (e.g., Cummings & Reimer, 2021; Davidson et al., 2022; Frackowiak et al., 2023, 2024b), mainly due to the mismatch between the conceptual definition of phubbing or technoference, and what is actually being measured. For instance, Frackowiak et al. (2025) pointed out that the TILES instrument (McDaniel & Coyne, 2016) enlists multiple scenarios in which technology is present or used, but not all of them imply a direct link between one's technology use and their direct distraction. Such practices may prompt further questions about what is actually being measured and studied in such empirical inquiries. Nonetheless, the aforementioned instruments continue to be applied in current studies, and the debate on what constitutes the appropriate measurement of co-present mobile phone use remains unsettled[5].

4. REASONS FOR CO-PRESENT PHONE USE

Most research on co-present smartphone use has visibly focused on its consequences across different dyads. However, research has also identified *reasons* for engaging in the use of smartphones around others. Notably, each of the dyads (e.g., parent-child or romantic partners) and their interactional contexts may have unique contextual features that drive the person to use their phone in the company of others. For instance, mothers tending to their children may use their devices to stay connected while parenting or to look up parenting tips (Radesky et al., 2016). Similarly, partners may use their device to look up interaction-relevant information or facilitate their plan-making (Foster Campbell, 2022). Yet, researchers have explored universal factors that explain one's propensity for using their phone around others.

4.1 Personality and Trait-like Characteristics

While personality traits cannot explain why individuals phub, individuals with certain personality traits have been shown to be more likely to phub than others. For example, studies have particularly pointed out conscientiousness (controlling impulses) and neuroticism (propensity for negative emotions; e.g., Erzen et al., 2021). Recent review of 79 studies shows that personality is one of the most relevant factors predicting co-present smartphone use (Arenz & Schnauber-Stockmann, 2023). Individuals low in agreeableness, conscientiousness, and openness, and high in neuroticism tend to phub more (see the review for sociodemographic and mental health factors). Beyond the 'Big Five', the 'Dark Triad' of personality (narcissism, psychopathy, and Machiavellianism) has also attracted research attention (e.g., Pearson & Hussain, 2015). The traits psychopathy

5 It is beyond the scope of this chapter to include further arguments. We invite the readers to read the existing commentary on the consequences of inconsistent use of terminology and operationalizations in co-present phone use research (Frackowiak, Ochs, et al., 2024).

and Machiavellianism (self-interest and manipulative personality) were not relevant in explaining the tendency to phub and only one type of narcissism is associated with phubbing. Vulnerable narcissism, characterised by lack of self-esteem and feelings of emptiness, shame, and helplessness, has been positively associated with the tendency to phub, but grandiose narcissism, characterised by inflated self-image and power and perfection fantasising, has not (Grieve & March, 2021).

Another trait-like characteristic that has been attributed to engaging in phubbing behaviours is self-control, which refers to the ability to override or change one's inner responses, as well as to interrupt undesired behavioural tendencies and refrain from acting on them (Tangney et al., 2004). The attribution stems from an intuitive assumption that individuals who may have difficulty controlling themselves may not be able to control their use of smartphones (Billieux et al., 2008). Indeed, there have been studies that made a link between low self-control and propensity to engage in phubbing behaviours (Isrofin & Munawaroh, 2024; Kuang, 2023; Latifa et al., 2019). An antithetic proxy to self-control is impulsivity, often covered in association with addictive behaviours, due to it being involved in various psychological states linked to dependence (Billieux et al., 2007). Some components of impulsivity are urgency, lack of premeditation, and sensation seeking (Whiteside & Lynam, 2001). Urgency may heighten perceived dependence as mobile phone use can satisfy strong impulses and provide short-term relief from negative emotions. A study found the urgency to be the most relevant predictor of dependency on mobile phone use (Billieux et al., 2007), and that along with lack of perseverance, urgency predicts elevated mobile phone use (Billieux et al., 2008). A recent study identified that attentional shifting, deliberate and spontaneous mind wandering predict phubbing (Sansevere & Ward, 2021). The Authors concluded that individuals who are impulsive and lack self-regulation are more likely to engage in phubbing behaviour.

Finally, though not a personality trait, one characteristic identified as relevant is fear of missing out (FoMO). FoMO is defined as the desire to stay connected with what others are doing, as one may miss out on rewarding experiences that others might have (Przybylski et al., 2013). FoMO involves feelings of social inferiority or loneliness, leading to compulsive behaviours to maintain social connections, such as frequently checking and refreshing notifications on mobile devices (Rifkin et al., 2015). The conceptual link between FoMO and impulsivity and low self-control mentioned in the previous paragraph is rather indisputable; nonetheless, it is worth making a distinction here. Whilst both impulsivity and self-control can contribute to FoMO that prompts phone use, FoMO also operates at a more structural level. It reflects the broader idea of a pervasive "digital presence" and the "technological unconscious" that shapes everyday behaviour beneath conscious awareness (Thrift, 2004; Vanden Abeele, 2021). It is therefore not surprising that FoMO predicts phubbing (Butt & Arshad, 2021; Tandon et al., 2022). However, such research is mainly conducted among young adults, with limited research on middle-aged and older populations, a tendency visible in the general research on phone use (Ansari et al., 2024).

4.2 Contextual Reasons

When examining phubbing behaviour, researchers should not overlook contextual predictors and state characteristics that influence co-present phone use during social interactions. For example, boredom during conversations has been a self-reported reason for phubbing (e.g., Al-Saggaf et al., 2019). Previous findings have also shown that people attempt to reduce negative emotions by engaging with technology (Elhai & Contractor, 2018). Another type of predictor of co-present mobile phone use that has been identified is other's phone use (Chotpitayasunondh & Douglas, 2016; Miller-Ott & Kelly, 2017). Users have also reported using their phone to signal that they do not want to socialise, signal disinterest or escape a situation (Elhai & Contractor, 2018). Lastly in terms of contexts, it is important to remember findings from the research on different types of dyads. Users are more inclined to use their phones around close relationships, such as with romantic partners or children. Furthermore, they tend to use their phones more frequently in the presence of friends than parents, owing to the more relaxed and non-committal nature of friendships.

5. BEHAVIOURAL ADDICTION DISCOURSE

The previous sections demonstrate that multiple factors account for the occurrence or absence of co-present mobile phone use, demonstrating its complexity and multifacetedness. We also debate whether co-present mobile phone use may be a by-product of behavioural addiction.

Behavioural addiction is defined as repeated behaviour leading to significant harm or distress over a prolonged period, causing functional impairment (Kardefelt-Winther et al., 2017, p. 1710). Researchers have argued phubbing to belong to the category of 'problematic phone use', classified as a behavioural addiction (Karadağ et al., 2015). The definition of behavioural addiction is subject to an ongoing debate (Billieux et al., 2015b; Kardefelt-Winther et al., 2017), but researchers have recognised loss of control, mood regulation, and continued use despite negative consequences as potential indicators (Billieux et al., 2015a). Smartphone users may develop a compulsive habit of checking their smartphone (Oulasvirta et al., 2012), and indeed, the link between technology-related addictions and tendency to phub has been documented in previous studies (e.g., Chatterjee 2020; Guazzini et al., 2021; Han et al., 2022; Lai et al., 2022). The tendency to use mobile devices in co-presence of others has been argued to be a product of multiple addictions (e.g., mobile phone, social media, internet, and gaming; Karadağ et al., 2015).

On the other hand, recent discourse regarding the use of media and technology has begun to acknowledge that assessing smartphone use and its potential negative connotations should not be measured in the same manner as substance use. Researchers have argued that medicalizing people's problematic technology use is disputable, as

it may misclassify occasional issues as pathological (e.g., Billieux et al., 2015b; Vanden Abeele, 2021). Even intensive usage of technology is not necessarily problematic nor associated with negative consequences and functional impairment (Billieux et al., 2019; Kardefelt-Winther et al., 2017). Similarly, Aagaard (2019) contends that phubbing should not be pathologized as an addiction but rather viewed as a 'bad habit' driven by automatic phone use and external motivations, such as push notifications. In terms of motivations, it has been postulated that individuals seek digital content and that smartphone's support in achieving daily tasks can be beneficial for one's well-being, rather than deteriorate it (e.g., Vanden Abeele, 2021). The habit may also feed into the broader psychological factors, as we have already covered, hence not allowing for a systematic classification of behaviour as problematic.

While problematic smartphone use may not be akin to behavioural addiction, negative consequences of smartphone use do exist and need consideration. A broader framework than the addiction framework is necessary due to several critical shortcomings. First, the addiction framework often overlooks the positive impacts of smartphone use (e.g., Pancani et al., 2019), such as maintaining meaningful relationships. Second, it fails to recognise the nuanced and varied impacts of smartphone use, which differ across individuals, societies, and socio-demographic groups (Griffioen et al., 2021, Nawaz, 2024). Accordingly, depending on the type of use, there may also be no clear benefits or pitfalls stemming from smartphone use (Nawaz, 2024; Vanden Abeele, 2021). Therefore, a comprehensive approach is needed to understand the effects of smartphone use.

Finally, we are prompted to engage in a reflection on how the phenomenon plays into the behavioural addiction narrative. We state upfront that we do not believe that classifying phubbing as a behavioural addiction is a correct practice. It is a prominent and recurring behaviour in contemporary society, but one that ought not to be attributed a label of addictive disorder. This attribution is not *entirely* inconceivable, given that *some* aspects that explain the propensity to phub (e.g., impulsivity, low self-control, compulsive checking) may seem to align with factors involved in other disorders classified as addictive. Additionally, frequent co-present phone use *could* be classified as dysfunctional conduct, in parallel to behaviours such as compulsive buying (Billieux et al., 2007), but excessive engagement in this activity does not necessarily warrant a label of a psychiatric disorder (Mihordin, 2012). In addition, given the proposed definition of a behavioural addiction by Kardefelt-Winther and colleagues (2017, p. 1710), excessive involvement in phubbing could be understood as such, but the authors highlight the exclusion criteria to avoid misclassifying problems caused by other factors as addictions. One criterion is that functional impairment results from wilful behavioural choices: the relational harm that is an assumed outcome of phubbing, would be a product of the phubber's choice to use their phone around the interlocutor, even though external prompts may feed into the pressure to respond to notifications (e.g., Flayelle et al., 2023). Furthermore, Kardefelt-Winther et al. (2017) add another exclusionary criterion, i.e., the behaviour is the result of a coping strategy. It is documented in existing studies that individuals may

engage in co-present mobile phone use as a way to reduce negative affect or, in couples, to de-escalate a conflictual interaction with their partner (Caughlin et al., 2016). Finally, in the context of the phenomenological framework of addiction (Gullo et al., 2022), it is brought up that the impaired control being the outcome of the excessive behaviour should not be affected by the context, or recurrent social, interpersonal, or occupational problems. However, in line with the two previous criteria, *any* co-present phone use is inevitably affected by the context.

Whilst we argue that co-present phone use is not a behavioural addiction, we do *not* believe that the behaviour is fully harmless. As we have previously demonstrated, phubbing *may* be excessive, it *may* promote relational harm and insensitivity to others' needs, and it *may* contribute to communication disturbance[6]. Additionally, it *could* be a symptom of *a* behavioural addiction or a disorder, as complicated as it is to make this argument given the lack of consensus and ongoing debates on what constitutes a behavioural addiction (Billieux et al., 2015b; Gullo et al., 2022; Kardefelt-Winther et al., 2017). However, as we highlight in our writing, these arguments are purely speculative, because a lot of factors associated with co-present phone use could be explained by context, which immediately disqualifies it as an addiction, despite its excessiveness (Slutske, 2006). Mobile phones are part of everyday life, and they grant swift navigation of daily tasks, leisure, and communication-related activities (Humphreys, 2005). Their inevitable overlap with co-present interactions does not have to reflect any clinical significance in terms of impairment or distress (Kardefelt-Winther et al., 2017). The ubiquitous use of mobile phones reflects a *zeitgeist*, in which the platforms accessible via a mobile phone serve as a digital extension of self, due to it being a user-specific device, a daily personal assistant, or simply *a necessity*. And given the continuous upwards trend in smartphone ownership over the last two decades, smartphones are likely to become even more interwoven into daily functioning, rendering the general population almost entirely dependent on them. Despite their salience and persistence over time, the two being elements of phenomenological framework of addiction (Gullo et al., 2022), the study of co-present phone use may require new theoretical models to understand the complex nature of the relationship between humans and mobile connectivity. We propose that researchers should strive to learn how individuals can achieve an optimal balance between being connected and disconnected, fostering "digital wellbeing" (Vanden Abeele, 2021).

6. CONCLUDING REMARKS

Smartphones have become integral to our daily lives, prompting the development of new social rules and dilemmas. This chapter delved into co-present mobile phone use from

6 Note that to understand the consequences of co-present phone use, the perspective of the "phubber" is insufficient, as their behaviour is subject to the interlocutor's interpretation (Vanden Abeele, 2020).

interdisciplinary perspectives, addressing mechanisms, consequences, reasons, and links to behavioural addictions. The complexity of this phenomenon defies single-factor explanations, as intra- and interpersonal mechanisms interact.

Existing studies and theories that show that smartphone impact on interactions varies among different dyads suggest that it's not simply harmful or benign. Individual traits, technology use, and context influence phone use around others. Although substantial research has been conducted, the field of co-present mobile phone use is neither exhausted *nor exhaustive*, with gaps in conceptual understanding of the phenomenon remaining. Debates continue about the real impact of smartphone use in the presence of others and whether technology universally causes harm to individuals or relationships. Therefore, more targeted, and meaningful inquiries into its multifaceted effects on human interaction are needed.

In line with the opening quote by Shoshana Zuboff, we propose that the research on the social use of smartphones should develop in the direction that does not solely concentrate on consequences, but rather on its function in individuals' daily lives. To construct a realistic framework that would involve smartphones, society, and wellbeing, researchers ought to explore how individuals can optimise their technology use to maintain healthy societal and digital well-being (Vanden Abeele, 2021). As a conclusion, we nonetheless suggest that researchers *do* keep in mind the harmful potential of smartphone use and the subtle ways in which the harm might manifest itself among the normatively accepted behaviours.

REFERENCES

Aagaard, J. (2020). Digital akrasia: A qualitative study of phubbing. *AI & Society*, *35*(1), 237–244. https://doi.org/10.1007/s00146-019-00876-0

Al-Saggaf, Y., & MacCulloch, R. (2019). Phubbing and Social Relationships: Results from an Australian Sample. *Journal of Relationships Research*, *10*, e10. DOI: 10.1017/jrr.2019.9

Al-Saggaf, Y., MacCulloch, R., & Wiener, K. (2019). Trait Boredom Is a Predictor of Phubbing Frequency. *Journal of Technology in Behavioral Science*, *4*(3), 245–252. DOI: 10.1007/s41347-018-0080-4

Amichai-Hamburger, Y., & Etgar, S. (2016). Intimacy and Smartphone Multitasking-A New Oxymoron? *Psychological Reports*, *119*(3), 826–838. DOI: 10.1177/0033294116662658

Ang, C.-S., Teo, K.-M., Ong, Y.-L., & Siak, S.-L. (2019). Investigation of a Preliminary Mixed Method of Phubbing and Social Connectedness in Adolescents. *Addiction & Health*, *11*(1), 1–10. https://doi.org/10.22122/ahj.v11i1.539

Ansari, S., Azeem, A., Khan, I., & Iqbal, N. (2024). Association of Phubbing Behavior and Fear of Missing Out: A Systematic Review and Meta-Analysis. *Cyberpsychology, Behavior, and Social Networking*. https://doi.org/10.1089/cyber.2023.0761

Arenz, A., & Schnauber-Stockmann, A. (2023). Who "phubs"? A systematic meta-analytic review of phubbing predictors. *Mobile Media & Communication*, 20501579231215678. https://doi.org/10.1177/20501579231215678

Avgustis, I., & Oloff, F. (2023). Mundane Food Photography: Managing Multiple Involvements in the Context of Self-Initiated Smartphone Use. *Social Interaction. Video-Based Studies of Human Sociality*, *6*(2), Article 2. https://doi.org/10.7146/si.v6i2.125292

Bartholomew, M. K., Schoppe-Sullivan, S. J., Glassman, M., Kamp Dush, C. M., & Sullivan, J. M. (2012). New Parents' Facebook Use at the Transition to Parenthood. *Family Relations*, *61*(3), 455–469. https://doi.org/10.1111/j.1741-3729.2012.00708.x

Beukeboom, C. J., & Pollmann, M. (2021). Partner phubbing: Why using your phone during interactions with your partner can be detrimental for your relationship. *Computers in Human Behavior*, *124*, 106932. https://doi.org/10.1016/j.chb.2021.106932

Billieux, J., Flayelle, M., Rumpf, H.-J., & Stein, D.J. (2019). High involvement versus pathological involvement in video games: A crucial distinction for ensuring the validity and utility of gaming disorder. *Current Addiction Reports, 6,* 323-330. https://doi.org/10.1007/s40429-019-00259-x.

Billieux, J., Maurage, P., Lopez-Fernandez, O., Kuss, D. J., & Griffiths, M. D. (2015a). Can Disordered Mobile Phone Use Be Considered a Behavioral Addiction? An Update on Current Evidence and a Comprehensive Model for Future Research. *Current Addiction Reports*, *2*(2), 156–162. https://doi.org/10.1007/s40429-015-0054-y

Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015b). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, *4*(3), 119–123. DOI: 10.1556/2006.4.2015.009

Billieux, J., Van der Linden, M., d'Acremont, M., Ceschi, G., & Zermatten, A. (2007). Does impulsivity relate to perceived dependence on and actual use of the mobile phone? *Applied Cognitive Psychology, 21*(4), 527–537. https://doi.org/10.1002/acp.1289

Billieux, J., Van der Linden, M., & Rochat, L. (2008). The role of impulsivity in actual and problematic use of the mobile phone. *Applied Cognitive Psychology, 22*(9), 1195–1210. https://doi.org/10.1002/acp.1429

Booth, M. A., Coyne, S. M., Yorgason, J. B., & Dew, J. P. (2021). Domestic bliss, or technological diss? Problematic media use, partner responsiveness, and relationship outcomes. *Journal of Social & Personal Relationships*, *38*(12), 3610–3632. DOI: 10.1177/02654075211031000

Bowlby, J. (1969). *Attachment and Loss, Vol. 1: Attachment. Attachment and Loss.* New York: Basic Books.

Brauer, K., & Proyer, R. T. (2019). Dyadic Processes. In T. K. Shackelford & V. A. Weekes-Shackelford (Eds.), *Encyclopedia of Evolutionary Psychological Science* (pp. 1–8). Springer International Publishing. https://doi.org/10.1007/978-3-319-16999-6_1720-1

Brown, G., Manago, A. M., & Trimble, J. E. (2016). Tempted to Text: College Students' Mobile Phone Use During a Face-to-Face Interaction With a Close Friend. *Emerging Adulthood*, *4*(6), 440–443. https://doi.org/10.1177/2167696816630086

Butt, A. K., & Arshad, T. (2021). The relationship between basic psychological needs and phubbing: Fear of missing out as the mediator. *PsyCh Journal*, *10*(6), 916–925. DOI : 10.1002/pchj.483

Carnelley, K. B., Vowels, L. M., Stanton, S. C., Millings, A., & Hart, C. M. (2023). Perceived partner phubbing predicts lower relationship quality but partners' enacted phubbing does not. *Computers in Human Behavior*, 107860. DOI: 10.1016/j.chb.2023.107860

Chatterjee, S. (2020). Antecedents of phubbing: from technological and psychological perspectives. *Journal of Systems and Information Technology, 22*(2), 161–178. https://www.emerald.com/ins ight/1328-7265.htm

Chotpitayasunondh, V., & Douglas, K. M. (2016). How "phubbing" becomes the norm: The antecedents and consequences of snubbing via smartphone. *Computers in Human Behavior*, *63*, 9–18. https://doi.org/10.1016/j.chb.2016.05.018

Chotpitayasunondh, V., & Douglas, K. M. (2018). The effects of "phubbing" on social interaction. *Journal of Applied Social Psychology*, *48*(6), 304–316. DOI: 10.1111/jasp.12506

Clark, M. L., & Ayers, M. (1993). Friendship Expectations and Friendship Evaluations: Reciprocity and Gender Effects. *Youth & Society*, *24*(3), 299–313. DOI: 10.1177/0044118X93024003003

Cummings, R., & Reimer, T. (2021). Cellphone relevance in face-to-face interactions: The effects of cellphone use on conversational satisfaction. *Mobile Media & Communication*, *9*(2), 274–292. https://doi.org/10.1177/2050157920958437

de Sola Pool, I. (1977). *The Social Impact of the Telephone*. The MIT Press.

Denecker, F., Frackowiak, M., Perneel, S., Vanden Abeele, M., Ponnet, K., & De Marez, L. (2024). A dyadic multimethod study of "partner phubbing", smartphone conflict, and relationship quality in opposite-sex couples from Belgium. *Current Psychology*. Advance online publication. DOI: 10.1007/s12144-024-06893-7

Elhai, J. D., & Contractor, A. A. (2018). Examining latent classes of smartphone users: Relations with psychopathology and problematic smartphone use. *Computers in Human Behavior*, *82*, 159–166. 10.1016/j.chb.2018.01.010

Erzen, E., Odaci, H., & Yeniçeri, İ. (2021). Phubbing: Which Personality Traits Are Prone to Phubbing? *Social Science Computer Review*, *39*(1), 56–69. DOI: 10.1177/0894439319847415

Farber, M. (2016, June 9). Smartphones Are Making You Slack Off at Work. *Fortune*. https://fortune.com/2016/06/09/smartphones-making-you-slack-at-work-survey/

Farroni, T., Csibra, G., Simion, F., & Johnson, M. H. (2002). Eye contact detection in humans from birth. *Proceedings of the National Academy of Sciences of the United States of America*, *99*(14), 9602–9605. https://doi.org/10.1073/pnas.152159999

Flayelle, M., Brevers, D., King, D.L., Maurage, P., Perales, J.C., & Billieux, J. (2023). A taxonomy of technology design features that promote potentially addictive online behaviours. *Nature Reviews Psychology*, 2, Article 3. https://doi.org/10.1038/s44159-023-00153-4

Fortunati, L. (2002). The mobile phone: Towards new categories and social relations1. *Information, Communication & Society*, *5*(4), 513–528.

Foster Campbell, J. (2022). Rules for Mediated Romance: A Digital Exploration of How Couples Negotiate Expectations. *Journal of Computer-Mediated Communication*, *27*(3), zmac007. https://doi.org/10.1093/jcmc/zmac007

Frackowiak, M. (2020). *Phubbing behaviours versus romantic relationships. Emotion dynam-*

ics, dyadic interactions, and mental health. Unpublished Master thesis. [University of Surrey]. http://dx.doi.org/10.13140/RG.2.2.17425.10088

Frackowiak, M., Hilpert, P., & Russell, P. S. (2022). Partner's perception of phubbing is more relevant than the behavior itself: A daily diary study. *Computers in Human Behavior*, *134*, 107323. https://doi.org/10.1016/j.chb.2022.107323

Frackowiak, M., Hilpert, P., & Russell, P. S. (2024a). Impact of partner phubbing on negative emotions: A daily diary study of mitigating factors. *Current Psychology*, *43*(2), 1835–1854. https://doi.org/10.1007/s12144-023-04401-x

Frackowiak, M., Ochs, C., Wolfers, L., & Vanden Abeele, M. (2024). Commentary: Technoference or parental phubbing? A call for greater conceptual and operational clarity of parental smartphone use around children. *Journal of Child Psychology and Psychiatry, 65*(8), 1108-1114. https://doi.org/10.1111/jcpp.13917

Frackowiak, M., Sophie Russell, P., Vowels, M. J., & Hilpert, P. (2025). Disentangling the good, the bad, and the neutral of co-present mobile phone use: A new perspective on "partner phubbing". *Mobile Media & Communication, 13*(2), 295–318. https://doi.org/10.1177/20501579241298271

Gergen, K. (2002). The Challenge Of Absent Presence. *Perpetual Contact: Mobile Communication, Private Talk, Public Performance*, 227–241.

Grieve, R., & March, E. (2021). 'Just checking': Vulnerable and grandiose narcissism subtypes as predictors of phubbing. *Mobile Media & Communication*, *9*(2), 195–209. https://doi.org/10.1177/2050157920942276

Griffioen, N., Scholten, H., Lichtwarck-Aschoff, A., van Rooij, M., & Granic, I. (2021). Everyone does it—differently: A window into emerging adults' smartphone use. *Humanities and Social Sciences Communications*, *8*(1), 1–11. DOI: 10.1057/s41599-021-00863-1

Guazzini, A., Raimondi, T., Biagini, B., Bagnoli, F., & Duradoni, M. (2021). Phubber's Emotional Activations: The Association between PANAS and Phubbing Behavior. *Future Internet, 13*(12), Article 12. https://doi.org/10.3390/fi13120311

Gullo, M. J., Wood, A. P., & Saunders, J. B. (2022). Criteria for the establishment of a new behavioural addiction •: Commentary to the debate: "Behavioral addictions in the ICD-11". *Journal of Behavioral Addictions*, *11*(2), 191–198. https://doi.org/10.1556/2006.2022.00031

Hall, J., Baym, N., & Miltner, K. (2014). Put down that phone and talk to me: Understanding the roles of mobile phone norm adherence and similarity in relationships. *Mobile Media & Communication*, *2*(2), 134–153. DOI: 10.1177/2050157913517684

Halpern, D., & Katz, J. E. (2017). Texting's consequences for romantic relationships: A cross-lagged analysis highlights its risks. *Computers in Human Behavior*, *71*, 386–394. 10.1016/j.chb.2017.01.051

Han, J. H., Park, S.-J., & Kim, Y. (2022). Phubbing as a Millennials' New Addiction and Relating Factors Among Nursing Students. *Psychiatry Investigation, 19*(2), 135–145. https://doi.org/10.30773/pi.2021.0163

Harris, B., Regan, T., Schueler, J., & Fields, S. A. (2020). Problematic Mobile Phone and Smartphone Use Scales: A Systematic Review. *Frontiers in Psychology*, *11*. DOI: 10.3389/fpsyg.2020.00672

Heyman, J. L., & Human, L. J. (2024). Phone presence and relationship quality: Examining the role of emotion accuracy and bias. *Journal of Social and Personal Relationships*, 02654075241227591. https://doi.org/10.1177/02654075241227591

Hiniker, A., Sobel, K., Suh, H., Sung, Y.-C., Lee, C. P., & Kientz, J. A. (2015). Texting while Parenting: How Adults Use Mobile Phones while Caring for Children at the Playground. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, 727–736.

Hipp, C. J., & Carlson, R. G. (2021). The Dyadic Association among Technoference and Relationship and Sexual Satisfaction of Young Adult Couples. *Journal of Sex & Marital Therapy*, *47*(5), 508–520. DOI: 10.1080/0092623X.2021.1922562

Humphreys, L. (2005). Cellphones in public: Social interactions in a wireless era. *New Media & Society*, *7*(6), 810–833. DOI: 10.1177/1461444805058164

International Telecommunications Union. (2010). *The World in 2010. Facts and Figures.* https://www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf

Isrofin, B., & Munawaroh, E. (2024). The Effect of Smartphone Addiction and Self-Control on Phubbing Behavior. *Jurnal Kajian Bimbingan Dan Konseling, 6*(1). https://citeus.um.ac.id/jkbk/vol6/iss1/13

Karadağ, E., Tosuntaş, Ş. B., Erzen, E., Duru, P., Bostan, N., Şahin, B. M., Çulha, İ., & Babadağ, B. (2015). Determinants of phubbing, which is the sum of many virtual addictions: A structural equation model. *Journal of Behavioral Addictions*, *4*(2), 60–74. 10.1556/2006.4.2015.005

Kardefelt-Winther, D., Heeren, A., Schimmenti, A., van Rooij, A., Maurage, P., Carras, M., Edman, J., Blaszczynski, A., Khazaal, Y., & Billieux, J. (2017). How can we conceptualize behavioural addiction without pathologizing common behaviours? *Addiction*, *112*(10), 1709–1715. DOI: 10.1111/add.13763

Kelly, L., Duran, R. L., & Miller-Ott, A. E. (2022). Conversational partners' interactions in response to co-present mobile phone usage. *Communication Quarterly*, *70*(5), 537–559 https://doi.org/10.1080/01463373.2022.2095217

Kelly, L., & Miller-Ott, A. E. (2022). "I Just Like to Share My Life with My Partner:" Mobile Phone Integration in Romantic Partners' Face-to-Face Interactions. *Communication Research Reports*, *39*(4), 192–202. https://doi.org/10.1080/08824096.2022.2099823

Kelly, L., Miller-Ott, A. E., & Duran, R. L. (2017). Sports Scores and Intimate Moments: An Expectancy Violations Theory Approach to Partner Cell Phone Behaviors in Adult Romantic Relationships. *Western Journal of Communication*, *81*(5), 619–640. https://doi.org/10.1080/10570314.2017.1299206

Kelly, L., Miller-Ott, A. E., & Duran, R. L. (2019). Phubbing friends: Understanding face threats from, and responses to, friends' cell phone usage through the lens of politeness theory. *Communication Quarterly*, *67*(5), 540–559. 10.1080/01463373.2019.1668443

Kildare, C. A. (2017). *Infants' Perceptions of Mothers' Phone Use: Is Mothers' Phone Use Generating the Still Face Effect?* [Thesis or Dissertation, University of North Texas].

Knitter, B., & Zemp, M. (2020). Digital Family Life: A Systematic Review of the Impact of Parental Smartphone Use on Parent-Child Interactions. *Digital Psychology*, *1*(1), Article 1. DOI: 10.24989/dp.v1i1.1809

Kuang, Z. (2023). The Relationship between Bedtime Procrastination, Phubbing, and Self-control. *Transactions on Economics, Business and Management Research, 2*, 1–4.

Kushlev, K., & Dunn, E. W. (2019). Smartphones distract parents from cultivating feelings of connection when spending time with their children. *Journal of Social and Personal Relationships*, *36*(6), 1619–1639. https://doi.org/10.1177/0265407518769387

Lacohée, H., & Anderson, B. (2001). Interacting with the telephone. *International Journal of Human-Computer Studies*, *54*(5), 665–699. DOI: 10.1006/ijhc.2000.0439

Lai, X., Hu, C., Ying, L., Xu, H., Zhao, C., Yang, X., Yu, X., & Zhang, G. (2023). Risk and Protective Factors Associated With Smartphone Addiction and Phubbing Behavior Among College Students in China. *Psychological Reports, 126*(5), 2172–2190. https://doi.org/10.1177/00332941221084905

Lanette, S. (2018). *The Mere Presence of Mobile Phones During Parent-Teen Interactions* [UC Irvine].

Latifa, R., Mumtaz, E. F., & Subchi, I. (2019). Psychological Explanation of Phubbing Behavior: Smartphone Addiction, Empathy and Self Control. 2019 7th International Conference on Cyber and IT Service Management (CITSM), *7*, 1–5. https://doi.org/10.1109/CITSM47753.2019.8965376

Ling, R. (2012). *Taken for Grantedness*. The MIT Press.

McDaniel, B., & Drouin, M. (2019). Daily technology interruptions and emotional and relation-

al well-being. *Computers in Human Behavior*, *99*, 1–8. DOI: 10.1016/j.chb.2019.04.027

McDaniel, B. T., & Coyne, S. M. (2016). "Technoference": The interference of technology in couple relationships and implications for women's personal and relational well-being. *Psychology of Popular Media Culture*, *5*, 85–98. DOI: 10.1037/ppm0000065

McDaniel, B. T., Pater, J., Cornet, V., Mughal, S., Reining, L., Schaller, A., Radesky, J., & Drouin, M. (2023). Parents' desire to change phone use: Associations with objective smartphone use and feelings about problematic use and distraction. *Computers in Human Behavior*, *148*, 107907. DOI: 10.1016/j.chb.2023.107907

McEwan, B. (2024). Phubbing: A Debate over Connection vs. Divided Presence. In *The Mobile Media Debate*. Routledge.

Mehrabian, A. (1972). *Nonverbal Communication*. Transaction Publishers.

Mihordin, R. (2012). Behavioral Addiction—Quo Vadis? *The Journal of Nervous and Mental Disease, 200(*6), 489. https://doi.org/10.1097/NMD.0b013e318257c503

Miller-Ott, A. E., & Kelly, L. (2017). A Politeness Theory Analysis of Cell-Phone Usage in the Presence of Friends. *Communication Studies*, *68*(2), 190–207. https://doi.org/10.1080/10510974.2017.1299024

Nawaz, S. (2024). Distinguishing between effectual, ineffectual, and problematic smartphone use: A comprehensive review and conceptual pathways model for future research. *Computers in Human Behavior Reports*, *14*, 100424. DOI: 10.1016/j.chbr.2024.100424

Ochs, C., Kosnowski, N., Jaunin, A., & Sauer, J. (2025). Professionally phubbed: A mixed-method experiment measuring the effects of phone snubbing behavior during a job interview. *Mobile Media & Communication, 13*(2), 338-359.

Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing*, *16*(1), 105–114. https://doi.org/10.1007/s00779-011-0412-2

Pancani, L., Preti, E., & Riva, P. (2020). The Psychology of Smartphone: The Development of the Smartphone Impact Scale (SIS). *Assessment*, *27*(6), 1176–1197. https://doi.org/10.1177/1073191119831788

Park, Y., Fritz, C., & Jex, S. M. (2018). Daily Cyber Incivility and Distress: The Moderating Roles of Resources at Work and Home. *Journal of Management*, *44*(7), 2535–2557. https://doi.org/10.1177/0149206315576796

Pearson, C., & Hussain, Z. (1 C.E., January 1). *Smartphone Use, Addiction, Narcissism, and Personality: A Mixed Methods Investigation*.

Pew Research Center. (2021). *Mobile Technology and Home Broadband 2021*. https://www.pewresearch.org/wp-content/uploads/sites/20/2021/06/PI_2021.06.03_Mobile-Broadband_FINAL.pdf

Piercy, C. W., & Underhill, G. R. (2021). Expectations of technology use during meetings: An experimental test of manager policy, device use, and task-acknowledgment. *Mobile Media & Communication*, *9*(1), 78–102. https://doi.org/10.1177/2050157920927049

Przybylski, A. K., & Weinstein, N. (2013). Can you connect with me now? How the presence of mobile communication technology influences face-to-face conversation quality. *Journal of Social and Personal Relationships*, *30*(3), 237–246. https://doi.org/10.1177/0265407512453827

Radesky, J. S., Kistin, C., Eisenberg, S., Gross, J., Block, G., Zuckerman, B., & Silverstein, M. (2016). Parent Perspectives on Their Mobile Technology Use: The Excitement and Exhaustion of Parenting While Connected. *Journal of Developmental & Behavioral Pediatrics*, *37*(9), 694. DOI: 10.1097/DBP.0000000000000357

Radesky, J. S., Kistin, C. J., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M., Augustyn, M., & Silverstein, M. (2014). Patterns of Mobile Device Use by Caregivers and Children During Meals in Fast Food Restaurants. *Pediatrics*, *133*(4), e843–e849. https://doi.org/10.1542/peds.2013-3703

Raudaskoski, S., Mantere, E., & Valkonen, S. (2017). The influence of parental smartphone use, eye contact and 'bystander ignorance' on child development. In *Media, Family Interaction and the Digitalization of Childhood* (pp. 173–184). Edward Elgar Publishing.

Reis, H. T., Clark, M. S., & Holmes, J. G. (2004). Perceived Partner Responsiveness as an Organizing Construct in the Study of Intimacy and Closeness. In *Handbook of Closeness and Intimacy*. Psychology Press.

Rifkin, J., Cindy, C., & Kahn, B. (2015). Fomo: How the Fear of Missing Out Leads to Missing Out. *ACR North American Advances*, *NA-43*.

Roaché, D., Caughlin, J., Wang, N., & Pusateri, K. (2020). The Presence of a Mobile Phone Does Not (Necessarily) Change the Fundamental Processes of Face-to-Face Relational Conflict. *Human Communication & Technology*, *1*(2). DOI: 10.17161/hct.v1i2.13308

Roberts, J. A., & David, M. E. (2016). My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners. *Computers in Human Behavior*, *54*, 134–141. DOI: 10.1016/j.chb.2015.07.058

Roberts, J. A., & David, M. E. (2017). Put down your phone and listen to me: How boss phubbing undermines the psychological conditions necessary for employee engagement. *Computers in Human Behavior*, *75*, 206–217. DOI: 10.1016/j.chb.2017.05.021

Salmela, T., Colley, A., & Häkkilä, J. (2019). Together in Bed? Couples' Mobile Technology Use in Bed. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–12. https://doi.org/10.1145/3290605.3300732

Sansevere, K. S., & Ward, N. (2021). Linking Phubbing Behavior to Self-Reported Attentional Failures and Media Multitasking. *Future Internet*, *13*(4), Article 4. https://doi.org/10.3390/fi13040100

Slutske, W. S. (2006). Natural Recovery and Treatment-Seeking in Pathological Gambling: Results of Two U.S. National Surveys. *American Journal of Psychiatry*, *163*(2), 297–302. https://doi.org/10.1176/appi.ajp.163.2.297

Solecki, S. (2022). The phubbing phenomenon: The impact on parent-child relationships. *Journal of Pediatric Nursing: Nursing Care of Children and Families*, *62*, 211–214. DOI: 10.1016/j.pedn.2021.09.027

Solomon, D. H., Brinberg, M., Bodie, G. D., Jones, S., & Ram, N. (2021). A Dynamic Dyadic Systems Approach to Interpersonal Communication. *Journal of Communication*, *71*(6), 1001–1026. https://doi.org/10.1093/joc/jqab035

Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development*, *7*(4), 349–367. https://doi.org/10.1080/14616730500365928

Stevic, A., & Matthes, J. (2023). Co-present smartphone use, friendship satisfaction, and social isolation: The role of coping strategies. *Computers in Human Behavior*, *149*, 107960. https://doi.org/10.1016/j.chb.2023.107960

Stockdale, L. A., Coyne, S. M., & Padilla-Walker, L. M. (2018). Parent and Child Technoference and socioemotional behavioral outcomes: A nationally representative study of 10- to 20-year-Old adolescents. *Computers in Human Behavior*, *88*, 219–226. https://doi.org/10.1016/j.chb.2018.06.034

Sun, J., & Wong, N. (2024). "I Can't Believe I Phubbed Up Our Friendship!": Examining Relationships between Loneliness, Problematic Smartphone Use, Friend Phubbing, and Life Satisfaction. *Human Behavior and Emerging Technologies*, *2024*, e5558587. https://doi.org/10.1155/2024/5558587

Sun, J., & Yoon, D. (2023). Not My Fault to Phub Friends! Individual, Social, and Technological Influences on Phubbing and Its Consequences. *Human Behavior and Emerging Technologies*, *2023*, e4059010. https://doi.org/10.1155/2023/4059010

Tandon, A., Dhir, A., Almugren, I., AlNemer, G. N., & Mäntymäki, M. (2021). Fear of missing out (FoMO) among social media users: A systematic literature review, synthesis and framework for future research. *Internet Research*, *31*(3), 782–821. https://doi.org/10.1108/INTR-11-2019-0455

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success. *Journal of Personality*, *72*(2), 271–324. https://doi.org/10.1111/j.0022-3506.2004.00263.x

Thomas, T. T., Carnelley, K. B., & Hart, C. M. (2022). Phubbing in romantic relationships and retaliation: A daily diary study. *Computers in Human Behavior*, *137*, 107398.

Thrift, N. (2004). Remembering the Technological Unconscious by Foregrounding Knowledges of Position. *Environment and Planning D: Society and Space, 22*(1), 175-190. https://doi.org/10.1068/d321t

Timmerman, G. M. (1991). A concept analysis of intimacy. *Issues in Mental Health Nursing*, *12*(1), 19–30. https://doi.org/10.3109/01612849109058207

Togar, E. M., Vanden Abeele, M. M. P., van Wijk, C. H., Yasin, R. M., & Antheunis, M. L. (2023). An Actor-Partner Model of Partner Phubbing, Mobile Phone Conflict, and Relationship Satisfaction Between Romantic Partners in Liberia. *Journal of Social and Personal Relationships*, 02654075231169701. DOI: 10.1177/02654075231169701

Turkle, S. (2011). *Alone Together: Why We Expect More from Technology and Less from Each Other* (1st edition). Basic Books.

Ugur, N. G., & Koc, T. (2015). Time for Digital Detox: Misuse of Mobile Technology and Phubbing. *Procedia - Social and Behavioral Sciences*, *195*, 1022–1031. DOI: 10.1016/j.sbspro.2015.06.491

Vanden Abeele, M. (2020). The Social Consequences of Phubbing: A Framework and a Research Agenda. In R. Ling, L. Fortunati, G. Goggin, S. S. Lim, & Y. Li (Eds.), *The Oxford Handbook of Mobile Communication and Society* (p. 0). Oxford University Press.

Vanden Abeele, M. M. P. (2021). Digital Wellbeing as a Dynamic Construct. *Communication Theory*, *31*(4), 932–955. https://doi.org/10.1093/ct/qtaa024

Vanden Abeele, M. M. P., Frackowiak, M., & Antheunis, M. L. (2024). Co-present mobile phone use as an expectancy violation: Revisiting 'phubbing' in two lab-based experiments. *Social Influence*, *19*(1), 2419622. https://doi.org/10.1080/15534510.2024.2419622

Vanden Abeele, M. M. P., Hendrickson, A. T., Pollmann, M. M. H., & Ling, R. (2019). Phubbing behavior in conversations and its relation to perceived conversation intimacy and distraction: An exploratory observation study. *Computers in Human Behavior*, *100*, 35–47. https://doi.org/10.1016/j.chb.2019.06.004

Whiteside, S. P., & Lynam, D. R. (2001). The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*(4), 669–689. https://doi.org/10.1016/S0191-8869(00)00064-7

Wilson, R. E., Harris, K., & Vazire, S. (2015). Personality and Friendship Satisfaction in Daily Life: Do Everyday Social Interactions Account for Individual Differences in Friendship Satisfaction? *European Journal of Personality*, *29*(2), 173–186. https://doi.org/10.1002/per.1996

Wirth, J. H., Sacco, D. F., Hugenberg, K., & Williams, K. D. (2010). Eye Gaze as Relational Evaluation: Averted Eye Gaze Leads to Feelings of Ostracism and Relational Devaluation. *Personality and Social Psychology Bulletin*, *36*(7), 869–882. https://doi.org/10.1177/0146167210370032

Wolfers, L. N., Kitzmann, S., Sauer, S., & Sommer, N. (2020). Phone use while parenting: An observational study to assess the association of maternal sensitivity and smartphone use in a playground setting. *Computers in Human Behavior*, *102*, 31–38. https://doi.org/10.1016/j.chb.2019.08.013

Wolfers, L. N., Wendt, R., Becker, D., & Utz, S. (2023). Do you love your phone more than your child? The consequences of norms and guilt around maternal smartphone use. *Human Communication Research*, *49*(3), 285–295. https://doi.org/10.1093/hcr/hqad001

Yasin, R. M., Bashir, S., Abeele, M. V., & Bartels, J. (2023). Supervisor Phubbing Phenomenon in Organizations: Determinants and Impacts. *International Journal of Business Communication*, *60*(1), 150–172. https://doi.org/10.1177/23294884209071120

Zuboff, S. (1988). *In the Age of the Smart Machine: The Future of Work and Power*. New York: Basic Books.

27

VOLUNTARY SELF-EXCLUSION: WINDOW DRESSING OR EFFECTIVE HARM MINIMIZATION STRATEGY?

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ABSTRACT:

Voluntary self-exclusion (VSE) —or the act of deliberately prohibiting oneself from accessing gambling opportunities for a given amount of time— is one of the more popular and best researched harm reduction strategies available to people who gamble. This chapter provides an overview of VSE, its variants, and how it fits with other harm reduction initiatives. Studies looking at the qualitative experience of people who have chosen to self-exclude are introduced, shedding light on existing programs' strengths and weaknesses. Opportunities for improving the utility and efficacy of VSE are discussed, taking into consideration the increasingly remote nature of gambling participation. Using a motivational interviewing framework, the chapter concludes with recommendations for clinicians and casino employees on how to promote use of VSE and support people through the VSE process.

KEYWORDS:

gambling, self-exclusion, harm reduction, harm minimization

1. INTRODUCTION

Gambling is an innocuous form of entertainment for many people, but a non negligeable number develop problems because of their involvement. These problems can span a range of life domains, including psychological or physical health, relationships, and financial loss. Although gambling disorder was reclassified from an impulse-control disorder to an addictive disorder in latest versions of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) and the International Classification of Diseases (World Health Organization, 2024), impaired control continues to be a defining characteristic.

In many jurisdictions, voluntary self-exclusion (VSE) programs are offered by operators and regulators to help people who have difficulty controlling their gambling urges to stop or limit gambling. VSE programs allow players to ban themselves from accessing gambling opportunities for a given amount of time, ranging from months to years to lifetime. VSE is a self-initiated protective behavioural strategy, which differs from mandatory breaks in play, which are imposed and are non-discretionary. In Europe, the first self-exclusion schemes were offered in Austrian casinos in 1934 (Hayer & Meyer, 2011). North American jurisdictions followed suit many decades later, with the Canadian province of Manitoba implementing the first program in 1989 in its land-based casino (Nowatzki & Williams, 2002). Many jurisdictions around the world currently offer VSE programs in land-based casinos. More recently, the increasing availability of online casinos has also led to the development of online self-exclusion schemes.

Approximately 15% of individuals who report experiencing problem gambling in the past year report using VSE, and this rate drops to 0.53% among those with low-risk gambling (Bijker et al., 2023). Although this proportion may seem low, it is still higher than for various forms of treatment seeking (Hodgins et al., 2022). It is important to understand the effectiveness of VSE and explore ways to maximize its impact. To help make sense of the existing knowledge and support researchers, clinicians, gambling

operators, and other stakeholders, we present here an up-to-date overview of the literature on VSE.

2. VARIANTS OF VSE

As summarized by Motka et al. (2018), VSE programs differ across a variety of features. Programs differ in the length of the exclusion (from a few days to an indefinite period), scope of coverage (single game versus all games), and method of enrollment (approaching a security officer versus autonomously submitting a form online). Some programs are revocable (e.g., within 24 hours or after 12 months), while others are not.

The coverage of VSE programs also varies across jurisdictions. Although individual betting companies may allow their customers to self-exclude from their platform only, schemes with more widespread coverage exist. For instance, the Swedish Gambling Authority —managed by the government— has an online platform (www.spelpaus.se/en) that allows residents to simultaneously self-exclude from all licensed gambling operators. The United Kingdom (UK) has a similar website (www.gamstop.co.uk) which allows people to self-exclude from companies licensed to operate in Great Britain and Northern Ireland. It is a regulatory requirement that all UK remote licensed gambling operators integrate with the GAMSTOP scheme.

In the Canadian province of Ontario, there are currently 50 operators managing 81 gaming websites (iGaming Ontario, 2024). As of July 2024, Ontario residents who wish to self-exclude from online gambling need to do so with each operator individually. Until a universal self-exclusion scheme is adopted, the efficacy of such partial coverage is questionable given that, based on transactional data from UK banks, people who gamble online have accounts with two online operators on average (Behavioural Insights Team, 2021). Moreover, people with potentially concerning levels of gambling activity —and who would be most likely to benefit from VSE— had accounts with around five separate operators.

An important feature of VSE programs is how the exclusion is monitored and enforced. A review of self-exclusion programs in Canada showed that each province has its own breaching penalties (Nowatzki & Williams, 2002). Some have no penalty at all, whereas others impose legal trespassing charges, sometimes coupled with a monetary fine. To ensure people are effectively blocked from accessing casinos, facial or license plate recognition software can be used to identify people on the premises, and match them to information obtained at the time of self-exclusion (McCormick et al., 2018). Still, recognition technology may not be enough. Whether due to lingering bugs leading to false-positives, or the administrative and logistical hoops casino employees may need to jump through to effectively exclude a trespasser, some have argued that facial recognition software gives the illusion that something helpful is being done. In this sense, recognition technology is being implemented at the expense of other —potentially more

efficacious— ways of supporting VSE, such as the mandatory use of player cards tied to a person's identity (Selwyn et al., 2024).

3. WHO PARTICIPATES IN VSE

A systematic review of 16 studies evaluating VSE (Motka et al., 2018) found that people who choose to self-exclude are more likely to be male and to gamble on Electronic Gaming Machines (EGMs). They are also more likely to have a gambling disorder and to spend more on gambling compared to people who do not self-exclude. This systematic review also compared people who self-excluded from online versus land-based gambling operators. Although age differences were found between these two groups —with people excluding from online platforms being younger— this may be due to the fact that younger people are generally more likely to engage in online forms of gambling in the first place (Chóliz et al., 2021; Pallesen et al., 2021). People who self-excluded from online gambling were also less likely to report being motivated by financial problems or by concerns of significant others —elements which may also be more representative of younger populations, who are less likely to be financially autonomous and involved in committed relationships. Hence, any differences between people self-excluding from land-based versus online gambling operators should be interpreted with caution.

With the advent of online gambling, operators have started sharing some of their proprietary data with researchers to help understand and predict the gambling behaviours associated with harm. For instance, a study used behavioural data provided by three gambling operators across six European countries to identify behaviours within a two-month timeframe that could predict VSE the following (i.e., third) month (Hopfgartner, Auer, Griffiths, et al., 2023). Out of 25,270 people who gambled at least three times in the second month, 414 had self-excluded in the third month. People who self-excluded were more likely to a) have previously set a deposit limit, b) have self-excluded in the past, c) have made multiple deposits in a single session, d) use a greater number of different payment methods, or e) engage in multiple gambling types. The first two behavioural indicators show that the previous use of harm reduction strategies may be predictive of future VSE, whereas the latter three are consistent with the notion that greater gambling intensity is predictive of gambling harm.

In summary, people who choose to self-exclude tend to report higher levels of problem gambling and to present other associated risk factors (e.g., being male, engaging in multiple gambling types or gambling specifically on EGMs). They also tend to use VSE as a harm minimization tool, in conjunction with other strategies.

4. HOW EFFECTIVE IS VSE?

Although VSE is among the most frequently studied strategies to limit or prevent harm (Velasco et al., 2021), the extant literature cannot yet yield a definitive conclusion about its effectiveness. This is in part due to the wide variations regarding how VSE is implemented across jurisdictions, as well as how efficacy was itself assessed. For instance, self-reported measures on helpfulness or expenditure could yield different results than behavioural tracking data provided by gambling operators. Although the latter may seem to provide more objective measures that are less subject to recall bias, especially among people who deposit larger amounts of money (Auer et al., 2023), it fails to account for gambling that might occur outside of a provider's online platform or land-based premises.

4.1 From the Point of View of the Person who Self-Excludes

Compared to other treatment or support modalities available to people wishing to limit their gambling behaviour, VSE was rated as the most helpful by a sample of Canadian adults with past year problem gambling —more so than individual counselling, group therapy, or self-help materials (Allami et al., 2023). The only randomized controlled trial to specifically manipulate self-exclusion was conducted in France (Caillon et al., 2019). Half of the 60 participants were randomly assigned to self-exclude for a period of 7 days, while the remaining half continued to gamble as usual. After recontacting them 15 days and 2 months after their self-exclusion, gambling behaviours were reassessed to identify any changes. Although most people in the self-exclusion group rated the experience as positive and helpful, no differences were observed between groups in terms of money wagered, time spent, cravings or gambling problems. It must be noted that the fact self-exclusion was imposed through randomization —rather than purely voluntary— may have impacted results.

Avoiding this issue, studies looking at the self-reported efficacy of VSE from online or land-based venues have generally used naturalistic designs, whereby people who choose to self-exclude are surveyed, ideally before and after their self-exclusion period, to examine any potential VSE effects. In a review focusing only on self-exclusion from land-based venues, Kotter et al. (2019) found 19 naturalistic studies examining how VSE affects gambling behaviours and comorbid mental health issues. VSE was generally associated with reductions in problematic gambling and mental health symptoms. Although a small proportion of individuals demonstrated a rebound effect, increasing their gambling activity once the self-exclusion period was over, decreases in problem gambling levels after self-exclusion were the norm. Similarly, quality of life, mental health and substance use indicators —anxiety and depression being the most prevalent at the time of exclusion— generally improved after self-exclusion.

The number of studies assessing efficacy of VSE from online websites is much smaller. One study surveyed customers of six Australian websites about their use, attitudes,

and experience with various harm minimization tools including VSE (Gainsbury et al., 2020). Participants were recruited through invitation e-mails sent by the gambling websites. Out of the 12,000 people initially contacted, 564 (4.7%) fully completed the study questionnaire. Although these self-selected participants are probably not representative of all customers, about two thirds were aware of the possibility of registering for VSE, and 8% had tried it. Participants reported that temporary VSE had positive effects on various problem gambling indicators, mental health, and quality of life.

4.2 Using Real-World Operator Data

A French study used data from 4,887 poker players who self-excluded from a poker website (Luquiens et al., 2019). They were matched based on age, gender, and account duration (i.e., from account opening until self-exclusion) with a comparison group of 4,451 other players who did not self-exclude. Participants could self-exclude voluntarily for any time between one day and three years. To account for this spread in duration, the researchers created two groups of self-excluders: those who self-excluded for 90 days or less, and everyone else. They were also able to follow players after their return from self-exclusion for up to 12 months.

Self-exclusion, whether short or long-term, was generally associated with a decrease in money and time spent over a given month, for up to one year after returning to play. Results in terms of length of exclusion were inconclusive for those who were the most heavily involved in terms of money spent, although there may be a positive effect of longer-term self-exclusion among those who were most heavily involved in terms of time. Another real-world study using data from a British operator also found that short-term VSE did not appear to have an effect on gambling, when controlling for the amount of spending and the types of gambling formats engaged in prior to VSE (Hopfgartner et al., 2023).

Taken together, with their study strengths and limitations, these findings point to a positive effect of self-exclusion in general, but a limited effect of shorter-term self-exclusion among people who gamble more heavily. Although informative, existing behavioural tracking studies on VSE lack the ability to determine whether people who self-exclude continue to gamble or increase gambling on other land-based or online platforms. Findings may be specific to a person's experience on a given website, rather than representative of generalized changes in gambling behaviour.

In summary, VSE is generally reported as being helpful by people who choose to use it, a finding supported by behavioural tracking data from operators, and shorter periods tend to be less effective in reducing gambling involvement than longer breaks. Yet, some people breach their self-exclusion agreement (i.e., return to the same venue they self-excluded from) or relocate to other venues or websites. Even though specific numbers vary between studies and jurisdictions, this highlights the importance of supporting people's decision to self-exclude by increasing these programs' efficacy and coverage across venues.

5. GAMBLING DESPITE VSE

In 2019, Sweden introduced a nationwide self-exclusion system for all licensed gambling. Despite coverage of all legal gambling opportunities in the country, between 38% and 68% of people who self-exclude reported that they nonetheless gambled online, mostly through illegal online gambling operators (Håkansson & Åkesson, 2022; Håkansson & Komzia, 2023; Håkansson & Widinghoff, 2020). The two studies that examined whether problem gambling status could predict continued gambling despite VSE each found a 20 percentage-point difference in problem gambling rates between those who gambled on other websites and those who did not. Although the first study found a statistically significant difference between groups (89 vs. 69%, $p < .01$; Håkansson & Komzia, 2023), the second one did not (80 vs. 61%, $p = .10$; Håkansson & Widinghoff, 2020), possibly due to a smaller sample size leading to insufficient statistical power to detect a difference[1]. In addition, people who gambled despite VSE were more likely to report having received some form of treatment (medication or therapy) for poor mental health (Håkansson & Komzia, 2023). No sociodemographic differences were found between both groups (Håkansson & Komzia, 2023; Håkansson & Widinghoff, 2020).

5.1 Breaching VSE Agreements

In the Canadian province of British Columbia, where a state-owned monopoly is the sole legal gambling provider, a group of researchers followed people who enrolled in the VSE program. Participants were interviewed at enrollment, as well as 6 and 12 months later (McCormick et al., 2018). Out of the 269 participants who completed the 6-month follow-up, 19% admitted to attempting to enter a casino. The median number of attempts was three, ranging from 1 to 60 (one outlier participant is excluded from these numbers because they reported breaching more than 100 times). Participants reported being able to successfully enter a casino a median of two times, and half of the people reported being caught. Looking at successful breaches as a proportion of attempts, the researchers found that participants were successful 78% of the time. In terms of problem gambling outcomes at follow-up, people who reported breaching had smaller decreases in problem gambling scores compared to those who remained gambling-free or those who continued gambling but through informal means (i.e., not through the state-owned operator).

Another group of researchers reviewed 8 studies that conducted in-depth interviews and focus groups with people who had self-excluded (Devault-Tousignant et al., 2023). In terms of facilitators of breaching, one reason people gave for beaching was a lack of confidence that the casino could effectively monitor VSE. This perception is in

1 The study authors conducted this comparison with a total of 63 participants. A power analysis indicates that to detect a statistically significant difference between these two groups at the .05 level with 80% power, a total of 87 participants would be needed.

part attributed to the way gambling venues function in general. They can be crowded, making recognition difficult, and employee turnover may contribute to the issue. An analogy could be made with impaired driving. People are less likely to drive with a blood alcohol content above the legal limit in areas with more police road checks per capita (Fell et al., 2015) or when marketing campaigns highlighting increased surveillance are implemented (McCartt et al., 2009). Hence, to deter breaching, people who VSE must believe that actions are being taken by gambling providers to enforce their agreements.

In summary, there is mixed evidence regarding the long-term efficacy of VSE on gambling behaviour, and this may be due to discrepancies on how VSE programs are offered, and the ease with which these programs can be circumvented (Velasco et al., 2021). Even in Sweden's nation-wide centralized VSE system, between 40 and 60% of people report being able to continue gambling by engaging with unlicensed gambling websites (Håkansson & Åkesson, 2022; Håkansson & Komzia, 2023; Håkansson & Widinghoff, 2020). Thus, the efficacy or usefulness of these programs will depend on what is measured.

6. SUPPORTING PEOPLE WHO SELF-EXCLUDE

Catania and Griffiths (2023) conducted a study where they interacted with a gambling operator while posing as a person with gambling problems. They signed up for 50 online gambling websites and subsequently went through the self-exclusion process. After self-excluding, seven (14%) websites continued to send promotional e-mails to the researchers, with one website sending as many as five e-mails within a two-week span. Clearly, this type of behaviour should be prohibited as it targets people at a particularly high risk of gambling harm. Moreover, VSE enrollment is an opportunity to engage people in additional levels of support if needed.

6.1 Seeking Counseling After Enrolling in VSE

When it comes to pairing self-exclusion with counselling, studies conducted in British Columbia show that, even though a third of participants agree to be referred to counselling during enrolment in VSE, only about a sixth attend counselling services in the following six months (McCormick et al., 2018, 2022). Studies conducted elsewhere also show that only a minority of people who self-exclude —between 10 and 39%— seek professional help (Hayer & Meyer, 2011; Ladouceur et al., 2000; Nower & Blaszczynski, 2006). These low treatment-seeking rates are unsurprising as it is well documented that only about one in five people with problem gambling seek treatment in general (Bijker et al., 2022).

Still, when looking at those who *do* seek treatment during their self-exclusion period, the two British Columbian studies conflicted with each other regarding the added benefit of seeking treatment; one found that people attending counselling reported larger decreases in problem gambling severity (McCormick et al., 2018), whereas the other did

not find any difference between groups (McCormick et al., 2022). About half of people who did not seek treatment felt that they did not need this additional support, since VSE was seen as being a substitute for counselling. On the other hand, reasons provided by participants as to why counselling was helpful include the provision of suggestions, advice, or tools that contribute to not gambling. Hence, although the added effects of counselling on problem gambling severity may vary depending on various factors, it seems that counselling may at the very least be beneficial in preventing the breach of VSE conditions, which in turn may help protect against future gambling problems. To date, there are no randomized controlled trials assessing the added value of offering treatment to people who self-exclude.

6.2 Counselling When Returning to Play

A group of Canadian researchers examined the effect of an interactive video designed as an educational tool for people wanting to return to play after the end of a VSE term (Turner et al., 2021). Examples of topics addressed in the video include information about how slot machines and other games work, information on the odds of winning, and why chasing is a risky idea. Although all participants reported fewer gambling problems after returning to play, completing the video training had no effect on gambling problems. Although the group that completed the video had slightly higher scores on gambling-related knowledge compared to the group that did not, these differences were not statistically significant. The interactive video not achieving its desired effects may be due to several reasons, such as the video not sufficiently enhancing knowledge about gambling, or that knowledge itself is insufficient to alleviate gambling harms.

Other forms of training exist, though. Yakovenko and Hodgins (2021) tested the efficacy of a self-directed online intervention, which included motivational and self-management tools, by comparing it to an existing in-person self-awareness educational group. In essence, the programs allowed participants to reflect on their gambling behaviour and develop harm reduction strategies, to then make the informed choice of renewing self-exclusion or not. Examples of harm reduction strategies include leaving cash at home when outside the home, keeping a record of all money spent and earned, and having wages collected by a spouse or partner. Both the online and in-person workshops were associated with similar outcomes, including a reduction in problem gambling severity of time. Among people who gambled post-exclusion, a reduction in frequency and expenditure was observed over time in both groups. These results do not necessarily point to the success of the workshops themselves, since outcomes were not compared to a control group that did not participate in any workshop. However, they do highlight the practicality of implementing a self-directed online workshop to support people who self-exclude, since online tools are often more convenient and cost-effective. Future studies wishing to evaluate the efficacy of workshops when returning to play after VSE may therefore also consider the use of online programs.

In summary, supporting people who self-exclude, whether by intervening at VSE enrolment or when returning to play, seems to have a limited impact on problem gambling severity. Nonetheless, counselling may indirectly promote long-term recovery by preventing breaches to VSE agreements. The added benefit of providing educational or self-awareness workshops before returning to play has yet to be robustly demonstrated. Online and in-person programs may however be comparable in terms of their effectiveness.

7. HOW TO ENCOURAGE AND FACILITATE VSE UPTAKE

People with lived experience, clinicians, and researchers all agree that there is much to be gained by increasing uptake. VSE can be seen as a tool to quit gambling or to reduce related problems. It can be used as a stepping stone to treatment or simply as a useful tool to keep on hand (Blaszczynski et al., 2007). Online operators may use algorithms to identify people who are likely to self-exclude (Hopfgartner et al., 2023), and then nudge them through targeted messages to encourage and facilitate uptake. Land-based venues can train their staff to recognize signs of potentially harmful gambling (e.g., repeated trips to the ATM, overt expressions of anger, repeated or especially long visits to the casino), and intervene before problems escalate.

There is some indication that Motivational Interviewing (MI; Miller & Rollnick, 2023) can improve health screening uptake (Miller et al., 2017), including for problem gambling (Peter et al., 2021). At least in the short term, it can also be an efficacious approach to decreasing gambling frequency and expenditure (Yakovenko et al., 2015). In the case at hand, using MI techniques may therefore be a promising way to encourage people at risk for gambling problems to complete a self-assessment for problem gambling, or to consider enrolling in a VSE program. Gambling counsellors and casino staff may also use this approach to build self-efficacy in adhering to VSE programs and avoid circumvention.

MI provides a general framework for engaging with people who might be ambivalent about making changes in their life (Miller & Rollnick, 2023). The spirit of MI revolves around four elements: partnership, acceptance, compassion, and empowerment. As such, the helper aims to develop a vision of the relationship centered around the person they are helping, seeking to deeply understand, without judgment, what the person they are helping is going through. Hence, it is expected that the helper will avoid argumentation and confrontation, while also rolling with any resistance expressed by the person they are attempting to help. Yet, to foster change, the helper strives to communicate in a way to reflect ambivalence while emphasizing reasons to change and supporting self-efficacy.

When guiding discussions, the four component tasks involve engaging, focusing, evoking, and planning. As a way of affirming one's autonomy, the helper also avoids providing unsolicited advice. To support autonomy while also providing useful advice or correcting erroneous beliefs, a helper may choose to first ask about what a person

already knows, followed by a request for permission to share additional knowledge or correct any falsehoods. Once this is done, the helper may then ask about how this additional information resonates with one's prior knowledge or goals. To illustrate using a hypothetical example for VSE, consider the following conversation between a helper and a casino patron:

> Helper (*engaging with Patron*): Hello, I am *Joyce,* an employee here at the casino. As part of my job, I sometimes talk to people about their experience gambling in our casino. I was wondering if you would be willing to take a few minutes to chat about your gambling experience and various tools our casino offers.
> Patron: Sure.
> Helper (*asking about what the patron already knows*): In addition to allowing patrons to set their own spending limits, our casino also allows people to voluntarily self-exclude from our premises. How familiar are you with our voluntary self-exclusion system? What do you think about it?
> Patron: Yes, I have heard of it. I think it's great for someone who is addicted to gambling and needs to permanently stop on their own. Not me, though. I don't have a gambling problem.
> Helper (*being empathic, avoiding confrontation, and asking permission*): I'm happy to hear you do not have a gambling problem. It's true that self-exclusion can be helpful for people who suffer greatly from their gambling. Would you mind if I shared some additional information with you, just in case gambling starts becoming a problem for you?
> Patron: Sure.
> Helper (*providing additional accurate information and following up by asking what the person thinks about this new information*): Self-exclusion can be used by anyone to take a break from gambling. Sometimes, people may find themselves losing more money than expected, trying to recoup their losses by betting more, or may even feel sad or angry after gambling. Even without being addicted to gambling, some people may feel relieved by taking a temporary break. Not all self-exclusions last a lifetime. Some people may choose to self-exclude for shorter periods of time, such as 3, 6 or 12 months. I would love to hear your thoughts on this.

A casino patron may start seeing VSE differently and may even want to follow up with questions about how this can specifically be done. Given what we now know about the potential benefits of counselling during VSE, as well as some patrons' reluctance to initiate counselling, the same conversational style can be used to target specific beliefs or perceived norms regarding help seeking. For instance, some people who self-exclude refuse treatment because of erroneous beliefs regarding treatment affordability or languages spoken by counsellors (McCormick et al., 2022). Many of these barriers to

treatment can swiftly be identified and addressed by casino staff during VSE enrolment by taking an MI approach.

8. BEST PRACTICE INTERVENTIONS

8.1 Improve Marketing

Lack of publicity is an important barrier to self-exclusion, as some people have reported simply not being aware of the possibility to self-exclude (Devault-Tousignant et al., 2023). A series of randomized controlled studies conducted in Norway support the notion that targeted contacts promoting VSE can be helpful (Jonsson et al., 2019, 2020). Employees working at the Norwegian state-owned gambling operator, Norsk Tipping, used MI skills to lead telephone conversations with people who had lost a significant amount of money over the prior year. The employees encouraged patrons to reflect on their gambling habits —namely by getting them to estimate their past year losses and checking them with objective operator data. Various harm reduction strategies (e.g., setting limits, excluding from single or all games) were discussed. The telephone intervention had a significant effect on setting limits versus a group receiving no contact. Although no difference was found between groups for self-exclusion, this might be explained by the fact that VSE was only mentioned in 8% of calls, whereas 84% of calls mentioned limit setting. Importantly, 89% of customers and 90.6% of staff rated the telephone interaction positively.

Recently developed algorithms have been used to predict who would be more likely to voluntarily self-exclude (Hopfgartner et al., 2023). Using multiple different payment methods, frequent limit setting changes, past self-exclusion, and engaging in multiple types of games were all predictive of self-exclusion. Rather than waiting for someone to reach a tipping point —often precipitated by large financial losses— these algorithms can use these indicators to nudge people toward self-exclusion earlier. As highlighted in a review of gambling nudges (Fortier et al., 2024), a well-designed nudge will provide timely, task-relevant information, and will leverage personalized and normative feedback on one's gambling behaviour. Some of these behavioural indicators, such as engaging in multiple types of games, can also be observed by venue staff. In line with what has been suggested by people who have self-excluded, employees are perceived by participants as needing to play a role in identifying people at risk for gambling harm and intervene when necessary (Devault-Tousignant et al., 2023).

8.2 Training People in Contact with People who Gamble

Counsellors working with people who engage in harmful gambling use VSE as a tool to help people quit gambling but they can also consider it as potentially useful for individuals who want to moderate their gambling without quitting completely. As mentioned previously, people who continue to gamble informally (e.g., with friends) during their

self-exclusion agreement may still experience improved outcomes on problem gambling severity. Hence, reframing VSE as a harm reducing therapeutic tool that encourages self-reflection and limits potentially harmful behaviours can potentially increase its use by people who do not necessarily wish to abstain completely from gambling.

The quality of interactions with gambling operator staff differs greatly from venue to venue (Devault-Tousignant et al., 2023). Depending on the venue, some employees are perceived by people who gamble as lacking training to empathically intervene when someone is identified as potentially being at-risk, as well as sometimes lacking basic information on the VSE enrolment process. Training staff on these issues should not only improve accessibility to VSE programs, but also help them deal with situations when needing to confront people who have breached their agreements.

8.3 Accessibility and Privacy

People who gamble have identified privacy as a major deterrent for enrolling in VSE schemes, namely the fear of having information leaked and the confidentiality of the registration process (Devault-Tousignant et al., 2023). The often time-consuming and bureaucratic process of enrolling in VSE schemes can also be a non negligeable barrier. Websites are easier to access than potentially stigmatizing offices or kiosks in land-based venues and provide people wishing to enroll in VSE schemes the privacy needed to do so without fear of judgment. To further increase accessibility and reduce administrative tasks for the person wishing to self-exclude, VSE enrolment should also facilitate the seamless inclusion of as many operators or venues as desired.

8.4 Enforceability

For VSE to work, people need to believe in its credibility. Lack of trust in venues' ability to limit access has been reported by people who have enrolled in land-based self-exclusion schemes (Devault-Tousignant et al., 2023). Facial recognition by itself may have its limitations but combining it with other access controls such as license plate recognition or mandatory identification checks can greatly improve VSE schemes; a trade-off being the increased burden on casino employees to manage people trying to circumvent their self-exclusion agreements. One way of reducing the burden on employees, albeit at the expense of important changes in infrastructure, is for gambling venues to check patrons' identification when they are about to place a bet (e.g., by scanning a government-issued identification card).

8.5 Counselling Support

In addition to VSE, benefiting from counselling or other resources can have a variety of positive outcomes on people once their self-exclusion agreement expires. Counselling may help prevent people from circumventing agreements, while also providing them tools and advice that contribute to gambling less harmfully. Many people still have erroneous assumptions about what counselling entails, a reduction in problem gambling severity

over time. A mandatory service, such as safe gambling plan or brief educational course, may also provide the tools and self-reflection to reduce gambling harms. A referral to counselling, made in the spirit of MI, may also fill the needs of a subset of people participating in VSE schemes, whether at enrolment or reinstatement.

8.6 Reinstatement and Renewal

Many people report having enrolled in VSE programs numerous times (McCormick et al., 2022; Yakovenko & Hodgins, 2021). Extending a VSE term should be easy to initiate, and the option for extension should be well publicized. Once a self-exclusion agreement expires, and people wish to return gambling, a series of best practices can be put in place to reduce potential future harm. Different conditions may also apply depending on various markers of a person's gambling risk, such as whether they were caught breaching their self-exclusion agreement. It has been recommended that people automatically be excluded from marketing and loyalty programs, as well as any forms of credit offered by gambling institutions (Responsible Gambling Council, 2016).

9. CONCLUSION

VSE may serve a different purpose depending on the person and their circumstance. People who choose to self-exclude may see VSE as an opportunity to quit gambling or reduce related problems, while some may also use this as a stepping stone to treatment. People who self-exclude from their problematic gambling activities, but continue to gamble on less problematic forms, may fare better than those who breach their agreement by returning to their problematic gambling activity. As such, one must not necessarily be in favor of complete abstinence from gambling to encourage VSE, since the main benefit seems to come from taking a break from problematic gambling, using the opportunity to reflect on one's gambling behaviour and develop protective strategies to limit future harm.

Long-term effects of VSE have yet to be clearly demonstrated, especially considering that effects may be confounded by some people circumventing their exclusion. Relatively few studies have looked at online self-exclusion and much remains to be learned about the repeated use of VSE. Studies that can combine behavioural tracking data from operators, self-reported gambling behaviour, and MI interventions to self-reflect on past gambling behaviour should provide impactful results for all stakeholders involved. VSE is a promising strategy to reduce gambling-related harm, and in order to be efficacious, requires the collaboration of people who gamble, those who are there to support them, and those who provide opportunities to gamble.

REFERENCES

Allami, Y., Williams, R. J., Hodgins, D. C., Stevens, R., Shaw, C. A., el-Guebaly, N., Nicoll, F., Christensen, D. R., McGrath, D. S., & Belanger, Y. D. (2023). Canadians With Problem Gambling: Relative Popularity and Helpfulness of Treatment Options. *Canadian Journal of Addiction*, *14*(4).

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (Fifth Edition). American Psychiatric Association.

Auer, M., Hopfgartner, N., Helic, D., & Griffiths, M. D. (2023). Self-reported Deposits Versus Actual Deposits in Online Gambling: An Empirical Study. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-023-10230-1

Behavioural Insights Team. (2021). *Gambling behaviour: What can bank transaction data tell us? A feasibility study.* (Part 2: Analysis of HSBC UK customer data). https://www.bi.team/wp-content/uploads/2021/07/Patterns-of-Play-BIT-HSBC-report-final-June-4th-2021.pdf

Bijker, R., Booth, N., Merkouris, S. S., Dowling, N. A., & Rodda, S. N. (2022). Global prevalence of help-seeking for problem gambling: A systematic review and meta-analysis. *Addiction*, *117*(12), 2972–2985. https://doi.org/10.1111/add.15952

Bijker, R., Booth, N., Merkouris, S. S., Dowling, N. A., & Rodda, S. N. (2023). International Prevalence of Self-exclusion From Gambling: A Systematic Review and Meta-analysis. *Current Addiction Reports*, *10*(4), 844–859. https://doi.org/10.1007/s40429-023-00510-6

Blaszczynski, A., Ladouceur, R., & Nower, L. (2007). Self-exclusion: A Proposed Gateway to Treatment Model. *International Gambling Studies*, *7*(1), 59–71. https://doi.org/10.1080/14459790601157830

Caillon, J., Grall-Bronnec, M., Perrot, B., Leboucher, J., Donnio, Y., Romo, L., & Challet-Bouju, G. (2019). Effectiveness of At-Risk Gamblers' Temporary Self-Exclusion from Internet Gambling Sites. *Journal of Gambling Studies*, *35*(2), 601–615. https://doi.org/10.1007/s10899-018-9782-y

Catania, M., & Griffiths, M. D. (2023). Analyzing Consumer Protection for Gamblers Across Different Online Gambling Operators: A Replication Study. *International Journal of Mental Health and Addiction*, *21*(3), 1882–1897. https://doi.org/10.1007/s11469-021-00695-9

Chóliz, M., Marcos, M., & Lázaro-Mateo, J. (2021). The Risk of Online Gambling: A Study of Gambling Disorder Prevalence Rates in Spain. *International Journal of Mental Health and Addiction*, *19*(2), 404–417. https://doi.org/10.1007/s11469-019-00067-4

Devault-Tousignant, C., Lavoie, N., Côté, M., Audette-Chapdelaine, S., Auger, A.-M., Håkansson, A., & Brodeur, M. (2023). Qualitative Experience of Self-Exclusion Programs: A Scoping Review. *International Journal of Environmental Research and Public Health*, *20*(5), 3987. https://doi.org/10.3390/ijerph20053987

Fell, J. C., Waehrer, G., Voas, R. B., Auld-Owens, A., Carr, K., & Pell, K. (2015). Relationship of Impaired-Driving Enforcement Intensity to Drinking and Driving on the Roads. *Alcoholism: Clinical and Experimental Research*, *39*(1), 84–92. https://doi.org/10.1111/acer.12598

Fortier, M.-È., Audette-Chapdelaine, S., Auger, A.-M., & Brodeur, M. (2024). Nudge theory and gambling: A scoping review. *Frontiers in Public Health*, *12*. https://doi.org/10.3389/fpubh.2024.1377183

Gainsbury, S. M., Angus, D. J., Procter, L., & Blaszczynski, A. (2020). Use of Consumer Protection Tools on Internet Gambling Sites: Customer Perceptions, Motivators, and Barriers to Use. *Journal of Gambling Studies*, *36*(1), 259–276. https://doi.org/10.1007/s10899-019-09859-8

Håkansson, A., & Åkesson, G. (2022). Multi-operator Self-exclusion as a Harm Reduction Measure in Problem Gambling: Retrospective Clinical Study on Gambling Relapse Despite Self-exclusion. *JMIR Ment Health*, *9*(8), e37837. https://doi.org/10.2196/37837

Håkansson, A., & Komzia, N. (2023). Self-exclusion and breaching of self-exclusion from gambling: A repeated survey study on the development of a nationwide self-exclusion service. *Harm Reduction Journal*, *20*(1), 107. https://doi.org/10.1186/s12954-023-00822-w

Håkansson, A., & Widinghoff, C. (2020). Gambling Despite Nationwide Self-Exclusion–A Survey in Online Gamblers in Sweden. *Frontiers in Psychiatry*, *11*. https://doi.org/10.3389/fpsyt.2020.599967

Hayer, T., & Meyer, G. (2011). Self-exclusion as a harm minimization strategy: Evidence for the casino sector from selected European countries. *Journal of Gambling Studies*, *27*(4), 685–700. https://doi.org/10.1007/s10899-010-9227-8

Hodgins, D. C., Williams, R. J., Belanger, Y. D., Christensen, D. R., El-Guebaly, N., McGrath, D. S., Nicoll, F., Shaw, C. A., & Stevens, R. M. G. (2022). Making Change: Attempts to Reduce or Stop Gambling in a General Population Sample of People Who Gamble. *Frontiers in Psychiatry*, *13*. https://www.frontiersin.org/articles/10.3389/fpsyt.2022.892238

Hopfgartner, N., Auer, M., Griffiths, M. D., & Helic, D. (2023). Predicting self-exclusion among online gamblers: An empirical real-world study. *Journal of Gambling Studies*, *39*(1), 447–465. https://doi.org/10.1007/s10899-022-10149-z

Hopfgartner, N., Auer, M., Helic, D., & Griffiths, M. D. (2023). The Efficacy of Voluntary Self-Exclusions in Reducing Gambling Among a Real-World Sample of British Online Casino Players. *Journal of Gambling Studies*, *39*(4), 1833–1848. https://doi.org/10.1007/s10899-023-10198-y

iGaming Ontario. (2024, July 11). *Regulated iGaming Market*. https://igamingontario.ca/en/player/regulated-igaming-market

Jonsson, J., Hodgins, D. C., Munck, I., & Carlbring, P. (2019). Reaching out to big losers: A randomized controlled trial of brief motivational contact providing gambling expenditure feedback. *Psychology of Addictive Behaviors*, *33*(3), 179–189. https://doi.org/10.1037/adb0000447

Jonsson, J., Hodgins, D. C., Munck, I., & Carlbring, P. (2020). Reaching out to big losers leads to sustained reductions in gambling over 1 year: A randomized controlled trial of brief motivational contact. *Addiction*, *115*(8), 1522–1531. https://doi.org/10.1111/add.14982

Kotter, R., Kräplin, A., Pittig, A., & Bühringer, G. (2019). A Systematic Review of Land-Based Self-Exclusion Programs: Demographics, Gambling Behavior, Gambling Problems, Mental Symptoms, and Mental Health. *Journal of Gambling Studies*, *35*(2), 367–394. https://doi.org/10.1007/s10899-018-9777-8

Ladouceur, R., Jacques, C., Giroux, I., Ferland, F., & Leblond, J. (2000). Brief Communications Analysis of a Casino's Self-Exclusion Program. *Journal of Gambling Studies*, *16*(4), 453–460. https://doi.org/10.1023/A:1009488308348

Luquiens, A., Dugravot, A., Panjo, H., Benyamina, A., Gaïffas, S., & Bacry, E. (2019). Self-Exclusion among Online Poker Gamblers: Effects on Expenditure in Time and Money as Compared to Matched Controls. *International Journal of Environmental Research and Public Health*, *16*(22), 4399. https://doi.org/10.3390/ijerph16224399

McCartt, A. T., Hellinga, L. A., & Wells, J. K. (2009). Effects of a college community campaign on drinking and driving with a strong enforcement component. *Traffic Injury Prevention*, *10*(2), 141–147. https://doi.org/10.1080/15389580802701284

McCormick, A. V., Cohen, I. M., & Davies, G. (2018). Differential Effects of Formal and Informal Gambling on Symptoms of Problem Gambling During Voluntary Self-Exclusion. *Journal of Gambling Studies*, *34*(3), 1013–1031. https://doi.org/10.1007/s10899-018-9743-5

McCormick, A. V., Cohen, I. M., & Davies, G. (2022). *A review of BCLC's voluntary self-exclusion program: Client behaviours, experiences, and perceptions*. University of the Fraser Valley. https://hdl.handle.net/1880/117043

Miller, S. J., Foran-Tuller, K., Ledergerber, J., & Jandorf, L. (2017). Motivational interviewing to improve health screening uptake: A systematic review. *Patient Education and Counseling*,

100(2), 190–198. https://doi.org/10.1016/j.pec.2016.08.027

Miller, W. R., & Rollnick, S. (2023). *Motivational Interviewing: Fourth Edition: Helping People Change and Grow* (Fourth edition). he Guilford Press, a division of Guilford Publications, Inc. https://www.guilford.com/books/Motivational-Interviewing/Miller-Rollnick/9781462552795

Motka, F., Grüne, B., Sleczka, P., Braun, B., Örnberg, J. C., & Kraus, L. (2018). Who uses self-exclusion to regulate problem gambling? A systematic literature review. *Journal of Behavioral Addictions*, *7*(4), 903–916. https://doi.org/10.1556/2006.7.2018.96

Nowatzki, N. R., & Williams, R. J. (2002). Casino self-exclusion programmes: A review of the issues. *International Gambling Studies*, *2*(1), 3–25. https://doi.org/10.1080/14459790208732297

Nower, L., & Blaszczynski, A. (2006). Characteristics and Gender Differences Among Self-Excluded Casino Problem Gamblers: Missouri Data. *Journal of Gambling Studies*, *22*(1), 81–99. https://doi.org/10.1007/s10899-005-9004-2

Pallesen, S., Mentzoni, R. A., Morken, A. M., Engebø, J., Kaur, P., & Erevik, E. K. (2021). Changes Over Time and Predictors of Online Gambling in Three Norwegian Population Studies 2013–2019. *Frontiers in Psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.597615

Peter, S. C., Whelan, J. P., Pfund, R. A., & Meyers, A. W. (2021). Can motivational messages engage individuals at-risk for gambling disorder in an online assessment? *Psychology of Addictive Behaviors*, *35*(1), 124–131. https://doi.org/10.1037/adb0000591

Responsible Gambling Council. (2016). *Best Practices for Self-Exclusion: Reinstatement and Renewal*. Responsible Gambling Council. https://www.responsiblegambling.org/wp-content/uploads/insight-best-practices-for-self-exclusion-reinstatement-and-renewal.pdf

Selwyn, N., Smith, G., Andrejevic, M., Gu, X., & O'Neill, C. (2024). Facing up to Problem Gambling: Tracing the Emergence of Facial Recognition Technology as a means of Enforcing Voluntary Self-Exclusion. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-024-10308-4

Turner, N. E., Shi, J., Robinson, J., McAvoy, S., & Sanchez, S. (2021). Efficacy of a Voluntary Self-exclusion Reinstatement Tutorial for Problem Gamblers. *Journal of Gambling Studies*, *37*(4), 1245–1262. https://doi.org/10.1007/s10899-021-09998-x

Velasco, V., Scattola, P., Gavazzeni, L., Marchesi, L., Nita, I. E., & Giudici, G. (2021). Prevention and Harm Reduction Interventions for Adult Gambling at the Local Level: An Umbrella Review of Empirical Evidence. *International Journal of Environmental Research and Public Health*, *18*(18), Article 18. https://doi.org/10.3390/ijerph18189484

World Health Organization. (2024). 6C50 Gambling disorder. In *International statistical classification of diseases and related health problems (11th ed.)*. https://icd.who.int/browse/2024-01/mms/en#1041487064

Yakovenko, I., & Hodgins, D. C. (2021). Effectiveness of a voluntary casino self-exclusion online self-management program. *Internet Interventions*, *23*, 100354. https://doi.org/10.1016/j.invent.2020.100354

Yakovenko, I., Quigley, L., Hemmelgarn, B. R., Hodgins, D. C., & Ronksley, P. (2015). The efficacy of motivational interviewing for disordered gambling: Systematic review and meta-analysis. *Addictive Behaviors*, *43*, 72–82. https://doi.org/10.1016/j.addbeh.2014.12.011

EPILOGUE

BEYOND THE LABEL: TOWARDS A PARADIGM SHIFT IN NON-SUBSTANCE ADDICTIONS

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The term epilogue comes from the Greek *epílogos, epi-* (above, on top of, in addition to) and *logos* (word, speech, treatise). Although its meaning refers to the "conclusion" or "what is said at the end", in this case these lines are not intended to be a farewell, nor a summary of the chapters that make up this handbook. On the contrary, this epilogue is a response to the invitation made by Professor Luke Clark in the last lines of his prologue to dare to ask the right questions through innovative designs.

Under this premise, this text seeks to be a new starting point so that the knowledge gathered here goes beyond the ink and can be put to good use. As the poet T. S. Eliot writes in *Little Gidding*, the final movement of *Four Quartets*,

What we call the beginning is often the end
And to make and end is to make a beginning.
The end is where we start from.

Since its conception, the aim of this handbook has been to bring together the most cutting-edge knowledge on non-substance addictions, a task that could well be described as utopian given the complexity of the subject matter and the current situation we are experiencing. We are a society that has changed the way we relate and communicate due to the emergence of new technologies and their continuous rapid evolution, which multiplies opportunities at the same rate as risks. To address this scenario, the handbook has attempted to follow a linear path from definition and understanding through prevention and intervention, ending with new conceptual contributions. However, as mentioned, the purpose is not to end the journey here, but to keep it alive, encouraging new avenues of exploration for those questions that remain unanswered.

In this sense, and drawing once again on T. S. Eliot's poem,

We shall not cease from exploration
And the end of all our exploring

Will be to arrive where we started
And know the place for the first time.
Through the unknown, unremembered gate
When the last of earth left to discover
Is that which was the beginning...

There is no doubt that progress in this field has been constant but perhaps the time has come to pause and explore new paths that will allow us to respond to the challenges at hand. Therefore, if we accept the challenge of a new beginning, why not start with the basic unit, the word? Are the words we use really mirrors of reality, or, on the contrary, is it their very connotation that is shaping what we observe?

We cannot deny that nowadays the term 'addiction' is used with excessive familiarity and is used as a framework for understanding many of our most common behaviours (Sirvent et al., 2023). However, labelling a person as addicted, obsessive or dependent does not necessarily mean that they present the symptoms of the condition that society has "diagnosed" them with (Loscazlo & Giannini, 2025).

As we have seen throughout the chapters of this handbook, the proliferation of 'addictive language' has not been accompanied by conceptual clarification (Crane et al., 2025). *Addiction, disorder, disease, passion, compulsion, intense commitment...* Countless terms have been used to refer to these behaviours. At the same time, they are criticised for their lack of operational precision and their potential for stigmatisation by mixing *intense but healthy* involvement with *intense but problematic* involvement (Billieux et al., 2019; Rumpf et al., 2021; Slack et al., 2022). Recalling that the 'addictus' was, originally, someone who surrendered their freedom to pay a debt, we might ask ourselves whether talking about 'mobile phone or social media addiction' describes a loss of freedom or extreme behaviour born of a need for connection in a society that isolates us?

If we look back, for example, to 19th-century France, what is now identified as 'gambling addiction' or 'shopping addiction' would have been classified as monomanias, such as 'mania for gambling' or 'mania for shopping,' and was considered an indicator of partial insanity (Berrios, 1996). This historical comparison highlights how interpretations of behaviour, the terms used, and the diagnostic categories we assign to them depend on evolving cultural and epistemological contexts, reinforcing the need for frameworks that —rather than prematurely pathologizing extremes— situate them within cultural narratives, subjective meaning-making and developmental trajectories.

The relevance of this 'conflict' is such that in the DSM-5 and ICD-11 diagnostic manuals, the term 'addiction' has been replaced by 'disorder' in most cases, perhaps to reduce moral connotations and social stigma and dilute the value of the clinical label itself. Addressing this complexity requires understanding that addiction, historically linked to drugs and their patterns of tolerance and withdrawal, does not always fit with the reality of current phenomena (Holden, 2001). Using this term and everything that

underlies it as a 'catch-all' for any problematic behaviour does not seem to be the most appropriate approach.

The term 'addiction' may have been replaced, but the models and definitions seem to remain anchored in old frameworks derived from substances. The conceptual change does not seem to have reached the root and it is the epistemological weight of the word itself that continues to structure the entire theoretical and applied framework of the discipline. There is, therefore, an urgent need for alternative frameworks that more accurately reflect the phenomenology of these behaviours.

One of the possible consequences of making this change only partially, while maintaining the 'umbrella' of addiction, is to cling to criteria that ignore the unique nature of each activity. Perhaps the goal is not to find a common denominator, but rather to seek concepts and theoretical models adapted to the variability of realities we face today.

This scenario calls for an analytic posture that treats these phenomena as context-sensitive, meaning-laden extremes —each requiring careful person-centred interpretation. In this light, addiction can be understood as a paradoxical social-psychological mechanism: it often conceals the lived extremity for the subject —because the behaviour functions as a private strategy of regulation or identity-work— while at the same time it externalizes and renders the same extremity hyper-visible to observers, institutions and diagnostic systems. What the person experiences as stabilizing or intelligible practice may therefore be reframed by others as deviance, pathology or loss of control.

An asymmetry between first-person sense and third-person sight is not merely a semantic quirk but an epistemic hinge: it shapes which aspects of experience are attended to, which are medicalized and which remain unexamined. Recognizing this dynamic invites a shift in research and practice: from asking only whether a behaviour meets a categorial threshold, to asking what function behaviour serves for the person and how social processes make that private meaning legible or illegible.

Thus, for example, if we understood these behaviours from the perspective of 'extreme behaviours' rather than 'addictive' behaviours, it would not be possible to employ mere synonymy but rather a complete paradigm shift would have to take place. This would involve a complete reformulation, from a deep theoretical understanding of the phenomena to the development of new assessment tools. From this proposal, non-substance addictions could be understood beyond a mere pathological deviation from a supposed norm.

Under this framework behaviours currently labelled as addictive may be better understood as meaning-laden extremes —complex idiosyncratic responses whose character can be conceptually described along interrelated dimensions. By considering these behaviours not merely as disorders but as idiosyncratic extremes filled with meaning —experiences that reveal something essential about how individuals regulate and make sense of their lives— we allow ourselves to recognize that what appears as addiction may instead be an experience situated at the edges of a person's emotional or existential landscape.

Thus, extreme experiences transcend the dichotomous categorisation between 'normal' and clinically significant and while they can be constructive, they can also be transformative, creative or healing (Mihalits, 2025). Yet what appears excessive from the outside may be the symbolic form an extreme experience assumes to keep a life intact, a way of remaining in touch with oneself when the world grows indistinct. The question now would be, would it make sense to apply this epistemological shift in our field?

However, beyond conceptual and terminological debates, we cannot deny the evidence of a social reality that demands answers. Therefore, it is necessary to continue investing efforts in rigorous scientific research, but without ever losing sight of our goal, which is to serve people and society. Our responsibility is not only to name behaviours, but to work actively to improve the quality of life of those who 'navigate between extremes'. The route is open and the map is yet to be drawn; now all that remains is to accept the challenge of daring to draw those lines.

REFERENCES

Berrios, G. E. (1996). *The History of Mental Symptoms: Descriptive Psychopathology since the Nineteenth Century* (1st edn). Cambridge University Press. https://doi.org/10.1017/CBO9780511526725

Billieux, J., Flayelle, M., Rumpf, H.-J. & Stein, D. J. (2019). High Involvement Versus Pathological Involvement in Video Games: A Crucial Distinction for Ensuring the Validity and Utility of Gaming Disorder. *Current Addiction Reports*, *6*(3), 323–330. https://doi.org/10.1007/s40429-019-00259-x

Crane, K., Carman Copel, L., Domoff, S. E., Weissinger, G., Bernhardt, P. & Yost, J. (2025). Behavioural Addiction: A Concept Analysis. *Journal of Advanced Nursing*, *81*(8), 4584–4590. https://doi.org/10.1111/jan.16969

Eliot, T. S. (1943). *Little Gidding*. In *Four Quartets*. Harcourt, Brace & Company.

Holden, C. (2001). 'Behavioral' Addictions: Do They Exist? *Science*, *294*(5544), 980–982. https://doi.org/10.1126/science.294.5544.980

Loscalzo, Y. & Giannini, M. (2025). Methodological issues in behavioral addictions' research: A call for an unbiased analysis of excessive behaviors. *Addictive Behaviors Reports*, *21*, 100594. https://doi.org/10.1016/j.abrep.2025.100594

Mihalits, D. S. (2025). Toward a Differentiated Conceptualization of Extreme Experiences and Their Relevance To Integrative Mental Health Theory. *Integrative Psychological and Behavioral Science*, *59*(4), 1-36. Article 72. https://doi.org/10.1007/s12124-025-09931-6

Rumpf, H.-J., Batra, A., Bischof, A., Hoch, E., Lindenberg, K., Mann, K., Montag, C., Müller, A., Müller, K. W., Rehbein, F., Stark, R., Wildt, B. T., Thomasius, R., Wölfling, K. & Brand, M. (2021). Vereinheitlichung der Bezeichnungen für Verhaltenssüchte. *SUCHT*, *67*(4), 181–185. https://doi.org/10.1024/0939-5911/a000720

Sirvent, C., Blanco, P., Palacios, L., Miranda, M., Rivas, C. & de la Villa. (2023). *Guía de adicciones comportamentales. Fundación Española de Patología Dual (FEMD)*. Fundación Instituto Spiral. https://drogodependencias.femp.es/sites/default/files/Guia-adicciones-comportamentales.pdf

Slack, J. D., Delfabbro, P. & King, D. L. (2022). Toward a delineation of the differences between high engagement and problem gaming. *Addictive Behaviors Reports*, *16*, 100462. https://doi.org/10.1016/j.abrep.2022.100462

As a society, we must engage in serious and thoughtful reflection on what rapid technological development has meant for people's lives. Without demonising technology, it seems clear that the increasingly early, frequent, intensive and unsupervised use of many digital applications or platforms is not harmless, especially for children and adolescents. This use negatively affects various aspects of their lives, including physical health, mental health, cognitive development, and even school and family relationships. However, it is unfair to hold children, adolescents, or their families solely responsible for this negative trend. The tech industry has often treated minors exclusively as customers, rather than as individuals who should be protected by design. For their part, public authorities and politicians have not always been aware of the issue, have not been bold enough, or have been insufficiently committed to finding solutions. As researchers, we face the challenging task of analysing reality with the utmost rigour and prudence, avoiding both trivialisation and over-pathologisation of the problem, convinced that evidence will help us identify the right path. *Action research*: *no research without action and no action without research*. A century later, that remains our guiding principle. Science (and scientists) at the service of society, in the strictest sense of commitment and social responsibility.

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