

# INTERNET GAMING: hobby or behavioural addiction?

A. SAMOUÇO (anaisamouco@gmail.com)<sup>1</sup>, F. CAETANO<sup>2</sup>, M. ARAÚJO<sup>2</sup>, A. MATOS<sup>1</sup>, D. LASCASAS<sup>1</sup>, B. MARTINS<sup>1</sup>

<sup>1</sup> Unidade Local de Saúde do Norte Alentejano, E.P.E., Portalegre, Portugal | <sup>2</sup> Hospital de Magalhães Lemos, E.P.E., Porto, Portugal

## BACKGROUND

Over the past decades, video games have become one of the most preferred sources of entertainment worldwide, with a consumer base comprising **all age-groups and social status**.<sup>1</sup> However, concerns have emerged over its addictive potential, particularly with respect to online games. The objective of this work is to review and summarize the existing empirical data on this topic.

## METHODS

A research was performed on PubMed®, using the terms “game”, “gaming”, “videogame”, “addiction”, “pathological gaming”, “problematic gaming” and “gaming disorder”; the resulting articles were selected based on their interest to the topic and subsequently reviewed and summarized.

## RESULTS

Videogame industry has grown exponentially over the past decades, with development of progressively more diverse, creative, entertaining and interactive contents. **Widespread internet access** further contributed to this phenomenon, allowing real-time interaction among the players, anonymity, easy information exchange, absence of geographic restriction and free access to most contents, thus consolidating the popularity of online gaming and promoting the emergence of a wider consumer base.<sup>1</sup> In parallel, a growing concern has emerged over its potential pathological properties, including **risk of addiction** (particularly for online games), as excessive patterns of playing have been associated with severe social and health consequences.<sup>2</sup>

There has been some controversy surrounding this problem (and whether it should be considered a clinical disorder), including with regard to its conceptualization. Currently, most research supports its view as a **behavioral addiction** (similar to DSM-5’s “Gambling Disorder” category), considering it consists in a subset of behaviors that originate reinforcement from the performance of a particular behavior itself and, moreover, it presents clinical and neurobiological similarities with substance use disorders. Other less supported hypothesis suggest its conceptualization as an obsessive-compulsive-spectrum disorder, a manifestation of an underlying psychopathology, a coping mechanism (due to its frequent comorbidity with other disorders), or a behavioral pattern on the high end of normal.<sup>2-4</sup>

Further inconsistencies regarding this issue and the studies that approach it result, among others, from the multiple terms used to designate the phenomenon (e.g. “pathological gaming”), the absence of a gold-standard measure, the use of non-standardized and non-validated criteria for its definition, and the establishment of arbitrary thresholds to determine what level of engagement with video games constitutes a problem or addiction (considering the behavior along a continuous spectrum).

Nonetheless, its clinical relevance and need for more systematic research of the problem have led to its inclusion in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (categorized as “**Internet Gaming Disorder**”, Section III)<sup>5</sup> and the upcoming eleventh edition of the International Classification of Diseases (“**Gaming Disorder**” category).<sup>6</sup> In both manuals, diagnostic criteria for this entity assume its conceptualization as a behavioral addiction, including parameters such as impaired control over gaming, continuation or escalation of gaming despite its negative consequences, increasing priority given to gaming in detriment of other activities, with significant impairment in several life domains (both DSM-5 and ICD-11 require a period of 12 months for establishment of the diagnosis).<sup>4-6</sup>

Research results (despite methodological inconsistencies) suggest that gaming disorder (GD) constitutes an important health problem, with prevalence rates ranging from 0.2% to 29% of gamers, and higher among **male adolescents and young adults**.<sup>1,2,7,8</sup> Therefore, it appears that gaming, while popular, does not lead to substantive problems in the vast majority of players.

Several factors have been associated with this condition (**Table 1**); however, due to the predominantly cross-sectional nature of the studies conducted, it is still unclear whether they constitute predisposing factors or consequences (or both) of GD.

**Table 1. Factors associated with (Internet) Gaming Disorder**<sup>7-17</sup>

<b>GAME-RELATED FACTORS</b> <sup>9,10</sup>
✓ Higher than average playing frequency AND total playing time
✓ Preference for <b>online</b> gaming (++ Multiplayer online games)
<b>SOCIOECONOMIC FACTORS</b> <sup>8,10-12</sup>
✓ Poor academic performance (lower than average grades, lower educational background)
✓ Reduced recreational activities besides gaming, spending less time with family and friends
✓ Higher levels of perceived family disharmony (++ frequent fights with parents, broken home context)
✓ Antecedents of childhood abuse
✓ Spending more money on video games
<b>HEALTH FACTORS</b> <sup>8,11,12</sup>
✓ Worse self-reported health
✓ Reduced sleep time + Intensive problems falling asleep
✓ Self-care neglect (e.g. skipping meals, baths and toilet), Lower levels of sport and exercise
✓ Game related-injuries (e.g. hand and wrist pain, rhabdomyolysis)
✓ Heart disease, gastrointestinal disease and headaches
✓ Higher frequency of smoking, drinking and cannabis use
✓ Cardiopulmonary-related deaths, suicide, murder
<b>PSYCHOLOGICAL AND COGNITIVE FACTORS</b> <sup>8-15</sup>
✓ Deficits in self-esteem and self-concept
✓ Anxiety symptoms and depressive mood, thoughts of committing suicide
✓ History of mental health diagnosis (Depression, Anxiety disorders/Social Phobia, ADHD, Substance-use disorders)
✓ Attention problems
✓ Higher impulsivity, hostility and aggressiveness
✓ Higher rule-breaking cognitions and engagement in risky behaviors
✓ Low sociability and social integration, perceived lack of social support, feelings of loneliness
✓ Less perceived success, lower life satisfaction
<b>NEUROPHYSIOLOGICAL FACTORS</b> <sup>7,8,16,17</sup>
✓ Evidence of brain structural and functional alterations (Orbitofrontal cortex, Dorsolateral prefrontal cortex, Anterior cingulate cortex, Amygdala, Nucleus accumbens, Caudate nucleus, etc.)
• Consistent to what has been described for addictions in general

So far, only a small number of studies have assessed the longitudinal course of this condition (follow-up periods ranging from 6 months to 5 years), with inconsistent results regarding its evolution and diagnostic stability. On one hand, some results suggest it constitutes a **stable condition**, with a large proportion of individuals persistently evidencing pathological symptoms over time. On the other hand, however, it appears to have a **transient character**, as individuals cease exhibiting pathological symptoms over time, with apparent spontaneous “recoveries”.<sup>11,15,18-21</sup>

Treatment options are scarce and poorly studied; nonetheless, bupropion, escitalopram, methylphenidate and atomoxetine appear to have beneficial results (particularly in ADHD comorbidity). Cognitive-behavioral therapy has also been studied with effective results.<sup>22-24</sup>

## CONCLUSIONS

Despite attempts to attain an international consensus, this area is still involved in much controversy, with potential risk of pathologizing thoughts, feelings and behaviors that may be normal and unproblematic. The quality of research base is still low and lacking clinical data, and further research is needed to establish more clearly the defining characteristics of this condition, as well as efficient treatment interventions and prevention strategies.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**REFERENCES:** <sup>1</sup> 2018 Sales, demographic, and usage data: essential facts about the computer and video game industry: Entertainment Software Association. 2018. | <sup>2</sup> Przybylski, A.K., N. Weinstein, and K. Murayama, *Internet Gaming Disorder: Investigating the Clinical Relevance of a New Phenomenon*. *Am J Psychiatry*, 2017. 174(3): p. 230-236. | <sup>3</sup> You YH, Crowley MJ, Mayes LC, Potenza MN. *Are internet use and video-game-playing addictive behaviors? Biological, clinical and public health implications for youths and adults*. *Minerva psichiatrica* 2012;53:153-70. | <sup>4</sup> Saunders, J.B., *Substance use and addictive disorders in DSM-5 and ICD 10 and the draft ICD 11*. *Curr Opin Psychiatry*, 2017. 30(4): p. 227-237. | <sup>5</sup> American Psychiatric A. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. Arlington, VA: American Psychiatric Association; 2013. | <sup>6</sup> World Health O. *ICD-11 international statistical classification of diseases and related health problems*. Geneva: World Health Organization; 2018. | <sup>7</sup> Sussman, C.J., et al., *Internet and Video Game Addictions: Diagnosis, Epidemiology, and Neurobiology*. *Child Adolesc Psychiatr Clin N Am*, 2018. 27(2): p. 307-326. | <sup>8</sup> Muller KW, Janikian M, Dreier M, et al. *Regular gaming behavior and internet gaming disorder in European adolescents: results from a cross-national representative survey of prevalence, predictors, and psychopathological correlates*. *European child & adolescent psychiatry* 2014. | <sup>9</sup> Lemmens JS, Valkenburg PM, Peter J. *The effects of pathological gaming on aggressive behavior*. *Journal of youth and adolescence* 2011;40:38-47. | <sup>10</sup> Gonzalez-Bueso, V., et al., *Association between Internet Gaming Disorder or Pathological Video-Game Use and Comorbid Psychopathology: A Comprehensive Review*. *Int J Environ Res Public Health*, 2018. 15(4). | <sup>11</sup> Gentile DA, Choo H, Liau A, et al., *Pathological video game use among youths: a two-year longitudinal study*. *Pediatrics* 2011;127:e319-29. | <sup>12</sup> AJ VANR, Kuss DJ, Griffiths MD, Shorter GW, Schoenmakers MT, D VDM. *The (co-)occurrence of problematic video gaming, substance use, and psychosocial problems in adolescents*. *Journal of behavioral addictions* 2014;3:157-65. | <sup>13</sup> Coyne SM, Dyer WJ, Densley R, Money NM, Day RD, Harper JM. *Physiological indicators of pathologic video game use in adolescence*. *The Journal of adolescent health* 2015;56:307-13. | <sup>14</sup> Ferguson CJ, Ceranoglu TA. *Attention problems and pathological gaming: resolving the 'chicken and egg' in a prospective analysis*. *The Psychiatric quarterly* 2014;85:103-10. | <sup>15</sup> Scharkow M, Festl R, Quandt T. *Longitudinal patterns of problematic computer game use among adolescents and adults—a 2-year panel study*. *Addiction* 2014;109:1910-7. | <sup>16</sup> Kuss, D.J., H.M. Pontes, and M.D. Griffiths, *Neurobiological Correlates in Internet Gaming Disorder: A Systematic Literature Review*. *Front Psychiatry*, 2018. 9: p. 166. | <sup>17</sup> Potenza, M.N., *Clinical neuropsychiatric considerations regarding nonsubstance or behavioral addictions*. *Dialogues Clin Neurosci*, 2017. 19(3): p. 281-291. | <sup>18</sup> King DL, Delfabbro PH, Griffiths MD. *Trajectories of problem video gaming among adult regular gamers: an 18-month longitudinal study*. *Cyberpsychology, behavior and social networking* 2013;16:72-6. | <sup>19</sup> Thege B, Woodin EM, Hodgins DC, Williams RJ. *Natural course of behavioral addictions: a 5-year longitudinal study*. *BMC psychiatry* 2015;15:4. | <sup>20</sup> Van Rooij AJ, Schoenmakers TM, Vermulst AA, Van den Eijnden RJ, Van de Mheen D. *Online video game addiction: identification of addicted adolescent gamers*. *Addiction* 2011;106:205-12. | <sup>21</sup> Bouana-Pyrrou, P., et al., *Cross-Sectional and Longitudinal Evaluation of the Social Network Use Disorder and Internet Gaming Disorder Criteria*. *Front Psychiatry*, 2018. 9: p. 692. | <sup>22</sup> King, D.L., et al., *Treatment of internet gaming disorder: An international systematic review and CONSORT evaluation*. *Clin Psychol Rev*, 2017. 54: p. 123-133. | <sup>23</sup> Stevens, M.W.R., et al., *Cognitive-behavioral therapy for Internet gaming disorder: A systematic review and meta-analysis*. *Clin Psychol Psychother*, 2018. | <sup>24</sup> Zajac, K., et al., *Treatments for Internet gaming disorder and Internet addiction: A systematic review*. *Psychol Addict Behav*, 2017. 31(8): p. 979-994.