



Gaming Convergences with Other Digital Technologies: Gambling, Pornography, Social Media, and Streaming

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1 Background

Severe problems arising from gambling and gaming have been recognized through the diagnosis of gambling and gaming disorders [1]. In 2013, the American Psychiatric Association's Diagnostic and Statistical Manual of Mental

Disorders, Fifth Edition, (*DSM-5*) included Internet Gaming Disorder in Section III, dedicated to those conditions for which there was not yet sufficient empirical evidence to justify their consideration as mental disorders [2]. A few years later, the World Health Organization officially recognized gaming disorder in the

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International Classification of Diseases, Eleventh Revision (*ICD-11*)—adding another diagnosis to the category of “Disorders due to substance use or addictive behaviours,” along with Gambling Disorder [3].

Although problematic engagement in other online activities is increasingly acknowledged, evidence remains insufficient that these merit inclusion as other specific addictive disorders. There are similarities between non-substance-related addictive behaviors in terms of diagnostic criteria (which are modeled on criteria for substance use disorders), comorbidities, and treatment. Brand and colleagues established a set of criteria to inform decisions about which conditions could be included in the *ICD-11* category of “Other specified disorders due to addictive behaviours” [4]. These criteria include: i) clinical relevance of the addictive behavior, which impacts on an individual’s functioning; ii) existing theoretical models of addictive behaviors also explain the new condition; and iii) empirical evidence demonstrates neurocognitive, physiological, genetic, and psychological mechanisms shared with other addictive behaviors.

Nonetheless, there is currently limited evidence that problematic Internet use related to various activities is comorbid or related to each other. Among adults, recent studies using network analyses have demonstrated that gaming disorder and problematic pornography use, problematic shopping, problematic use of social networking sites, and problematic online gambling constitute relatively independent and distinct conditions, despite sharing certain similarities in terms of their clinical expression and symptoms [5].

The video game industry has undergone a significant evolution in recent years due to the convergence of various digital technologies. These developments have led to the incorporation of gaming elements into other products and apps, such as those related to online gambling, pornography, social media, and on-demand video-streaming. The convergence of gaming and gambling has potentially been the most noticeable; online gaming has incorporated gambling-

like elements such as loot boxes as well as in-game financial elements such as microtransactions, and in-game currencies that can be used (including through third parties) for gambling/gambling-like activities such as skins betting. Esports refers to professional gaming tournaments, which now represent a betting market [6]. Social games, often available through or linked with social media platforms, include a prominent genre called social casino games. Social casino games replicate gambling activities without real-money payouts—although players can pay to obtain virtual chips to gamble. This game genre consistently ranks among the most popular and profitable. Concerns have emerged that social casino games may increase favorable attitudes toward gambling and misrepresent the likelihood of winning [7], leading some individuals—including adolescents—to migrate to gambling because of their game play [8].

Increasing digitalization of activities has led to concerns about other potentially problematic online behaviors, such as social media use, on-demand streaming, and compulsive sexual behaviors (e.g., pornography viewing) [4]. The convergence of gaming and pornography has resulted in the creation of a new genre of video games known as “adult games.” These games feature sexually explicit content and often involve interactive elements that allow players to customize their avatar and control the actions of characters. The convergence of gaming and on-demand video-streaming has led to the creation of “gamified watching,” in which on-demand video-streaming platforms use gaming elements to encourage consumers to engage with content. Platforms include design features that challenge users’ self-control, as well as immersive, social, and comparative elements [9]. These developments raise concerns about the potential for dysregulated and addictive behaviors, exploitation of vulnerable groups (especially children and adolescents), and negative impacts on individuals and society. It is therefore crucial to consider carefully the ethical and social implications of these developments and ensure that they are regulated appropriately.

2 Current State

2.1 Gaming and Gambling

Similarities between video games and gambling have led to the proposition that video gaming could act as a “gateway” to gambling. However, to date, there is limited evidence to support this hypothesis [10]. A review found only a small correlation between overall gambling and video game engagement, which could be accounted for by demographic and personality factors [10]. There is also limited evidence of a relationship between problem gaming and problem gambling.

There does, however, appear to be a relationship between loot box purchases and problem gambling symptoms. Loot boxes are a “surprise mechanic” within games whereby players can win/earn or purchase an item (with real-world, virtual, or in-game currency) without knowing which item they will “randomly” receive. Meta-analytic evidence shows that people with greater symptoms of problem gambling spend more on loot boxes than people with fewer problem gambling symptoms [11]. The size of the association between loot box purchasing and problem gambling symptomology is typically stronger for adolescents than for adults. However, there is mixed evidence about whether loot box spending is associated with psychological distress [12, 13]. Further, evidence regarding the directionality and causality of relationships between problematic gambling and loot box spending is lacking.

Studies based on self-reports have found individuals who play social casino games also present with a tendency to gamble—although this may be related to having a specific interest in gambling activities. For example, an Australian study of adolescents found spending money on social casino games to be a risk factor for problem gambling and related to higher levels of psychological distress compared to social casino game players who had not paid to play [14]. Two-thirds of paying social casino game players recalled that their social casino game use preceded their involvement in gambling. A longitudinal study following up adolescents over time

found that simulated Internet gambling was related to onset of gambling and increased gambling problems; however, factors such as advertising, cognitive distortions, and gambling involvement also played a role [15].

2.2 Gaming and Social Media

A positive association between social media use and gaming has been described, as well as between problematic social media use and gaming disorder. Although epidemiological studies related to the prevalence of comorbidity between problematic social media use and gaming disorder are scarce, younger age has been described as a shared vulnerability factor [16, 17]. Potential vulnerability factors related to the development of these digital media-based addictive behaviors include social factors (e.g., lower perceived social competence; lower educational, social, and occupational levels), impulsivity, psychiatric comorbidities (e.g., anxiety, depression, substance use, attention deficit/hyperactivity disorder, obsessive-compulsive disorder), and brain development stage (e.g., higher affective and behavioral dysregulation at early ages due to lower neurological maturity)—with influence varying according to age and sex [16, 18].

Beyond risk factors for problematic use of social media and video games and their differences by sex/gender, it is important to consider the convergence between both forms of entertainment and communication. Social media platforms (e.g., Facebook, Twitch, YouTube, Douyu) can integrate gaming activity from multiple genres including direct access to games, and by creating a platform for gaming communities to host discussions [17]. This potentially involves the need for users to share data or register on a platform to access certain games and related content, which may create privacy and security risks for users, who in many cases are children or adolescents.

Gamers often report spending leisure time on other screen-related activities [19], such as using social platforms to watch videos of gameplay or share gaming-related content (e.g., *YouTube*).

Gaming communities (i.e., in-game communities) are inherent to gaming [20]. Identification with the social identity of a virtual community modulates gaming behavior and potentially motivates gaming and normalizes maladaptive gaming behaviors [20]. Apart from in-game communities, forums exist where gamers interact, share, and discuss their experiences. In the social context of in- and out-game communities, gamers may modulate others' gaming habits within a gaming network—a type of social contagion effect [20]. In contrast with gambling, a protective role of gaming communities in relation to problematic gaming and purchasing has not yet been described, possibly conditioned by the potential detrimental impact on the game performance for the team [20]. In this context, social networking via social platforms allows people with similar interests to be connected, but might contribute to maintenance of the problematic behavior due to social pressures and distorted cognitive aspects (e.g., “fear of missing out”) [18].

The convergence of social media and gaming/gambling is apparent through advertising for online activities on social media seeking to attract new users. Social media users might have greater exposure to gaming and gambling activities, and subsequently be more likely to experience related harms.

2.3 Gaming and Problematic Pornography Use

Male sex and younger age are two key shared vulnerability factors for problematic gaming and pornography use [21]. A systematic review of experimental studies suggests that problematic pornography use is related to attentional biases, deficient inhibitory control, poorer performance in tasks assessing working memory, and decision-making impairments [22]. These cognitive processes are also relevant when explaining the manifestation and severity of gaming disorder [23], meaning that both conditions share similar cognitive underpinnings. Gaming disorder and problematic pornography are driven by common

motives (e.g., hedonic/recreation-related motives, pleasure seeking, fantasy or escape from stress or intense negative emotions) and share underlying psychological processes [24]. Studies show that the prevalence, frequency, and pattern of pornography consumption (including the risk of developing problematic pornography use) is similar—or even increased—among adolescents [25], suggesting that features promoting over-engagement may especially affect this population.

Ecological data relating to the 2018 crash of Fortnite (one of the most popular video games among adolescents) showed that during forced abstinence from gaming, pornography use increased—in particular, consumption of pornographic content related to the video game [26]. This increase suggests that pornography consumption may constitute a “compensation behavior,” such as researching information about video games in forums or watching gaming videos on YouTube [27].

At the intersection between gaming, problematic pornography use, and social networking is the use of massively multiplayer virtual worlds for sexual purposes (e.g., Second Life). Second Life is an online multimedia platform that allows people to create avatars and interact with other users. Built-in customization tools allow users to sexualize their avatars according to personal preferences and engage in sexual interactions with other users (or “avatar sex”) [28].

Pornographic websites commonly include design elements that seek to optimize user engagement (e.g., search by preferred categories, algorithm-based content recommendations), facilitating an immersive and interactive viewing experience, and increasing attention and “time on site.” [29] Dating apps, such as Tinder, are another example where gaming elements are incorporated with the aim of increasing “time on site.” Tinder’s design (the overall interface, “swiping” function) gamifies the process of finding a date. Basic dynamics of Tinder use include rewarding elements (e.g., receiving a match), as well as multiple features that might promote uncontrolled and problematic engagement [9]. Design features similar to those used by the

gaming and gambling industry might promote excessive engagement in online pornography use and related sexual behaviors.

2.4 Gambling, Gaming, and On-Demand Video Streaming

Evidence suggests that problematic patterns of on-demand video streaming and binge-watching (i.e., watching multiple episodes of a TV series in one session) occur among adults. However, research on this topic studying adolescent populations remains in its infancy. Paschke and colleagues suggest that adolescents might be especially vulnerable to developing problematic on-demand video streaming/binge-watching due to immature cognitive-control abilities [30]. Preliminary qualitative research suggests that binge-watching in adolescence is primarily prompted by a fear of missing out. That is, adolescents potentially feel pressure to be part of a cultural conversation and a need to immerse themselves in TV series to avoid boredom and to escape from everyday life [31]. Similar to well-established correlates of gaming disorder, correlates of binge-watching and problematic on-demand video streaming in adolescence include depression, anxiety, symptoms of insomnia, poorer school performance, loneliness, emotional problems, conduct problems, cognitive problems, and inattention [30].

Attention has also been paid to the promotion of gambling via video game streaming services, such as Twitch. One study found that Twitch, which primarily streams video game content, also streams gambling with social and real money prizes and was used by content creators as a strategy to increase gambling engagement and monetization [32].

3 Future Research

Ongoing research is needed given the dynamic nature of online activities and differences between generational cohorts.

Large, representative samples are needed to explore vulnerability profiles and protective factors, the clinical course of conditions, influence of comorbidities, and relationships with psychological well-being, as well as predictors of severity for problematic online behaviors, including among children and adolescents. Longitudinal research is needed over the course of adolescence to young adulthood to determine if individuals naturally “grow out” of problematic online behaviors. Exploration of the long-term consequences of early and prolonged exposure to various online content types is a research priority—particularly in terms of the potential to interfere with development, foster unhealthy attitudes and values, and undermine emotional and psychological well-being.

Research should consider the impact of specific design features and mechanics within games and gamified online activities [9], with a view to identifying predatory mechanics that might act to deceive or exert undue influence on individuals [33], especially children and adolescents who do not have well-developed analytical and decision-making abilities.

4 Recommendations

- The constantly evolving digital environment, and the changing nature of consumers’ interactions with emerging technologies mean that legislative, regulatory, and judicial bodies need to reassess the consideration (i.e., the wager) and prize components of legal definitions of gambling. In particular, defining the “value” of virtual objects is relevant, including what constitutes a consideration of value by users in both the digital and “real” worlds.
- As many online content providers are not specifically regulated and industry self-regulation may be insufficient to protect consumers, particularly children and adolescents, greater efforts are needed to assess the suitability of content offered through online platforms and age restrictions for various activities and products. Active involvement of policymakers is crucial in the development of effective

educational, preventive, and therapeutic strategies related to digital media use.

- Parents should be involved in their children's use of digital media, monitoring screen time per day and actively encouraging engagement in entertainment activities other than online gaming, video streaming, and social networking. Parents should monitor game play to ensure that games played by children and adolescents do not contain age-inappropriate content and participate in age-appropriate online activities with adolescents to enable informed discussions around identifying and responding to risky scenarios and setting healthy boundaries on use.
- Educational centers should provide information to students and parents related to adaptive and healthy uses of digital media, help educators and parents to screen and identify potential problematic behaviors, encourage non-screen leisure activities, and provide referrals to specialized services when necessary.
- Social media and networks linked to gaming should contain warnings about risks relating to privacy and social relations in the virtual world (e.g., cyberbullying, *griefing*, *trolling*, *identity theft*, and *grooming*) [34].
- Clinicians, including generalists and specialist health workers, should receive training enabling them to identify online problematic behaviors among children and adolescents. Clinical programs should distribute social, psychoeducational, and therapeutic resources related to digital media use among parents and at-risk/affected individuals.
- Health campaigns should be developed to increase awareness about the potential for games to contain age-inappropriate content for children and the importance of balancing screen time with other activities as part of a healthy lifestyle.

Conflict of Interest and Funding Disclosures SG has an updated conflict of interest statement available here: <https://www.sydney.edu.au/science/about/our-people/academic-staff/sally-gainsbury.html>. TS has

received a PhD scholarship through the NSW Government's Gambling Research Capacity Grants program, funded by the NSW Responsible Gambling Fund, and supported by the NSW Office of Responsible Gambling. He has been awarded student travel grants by the National Association for Gambling Studies. FF-A and SJ-M received consultancy honoraria and conference traveling support from Novo Nordisk and FFA editorial honoraria as EIC from Wiley. IB, GM-B, JC-C, MF, and JB have no conflict of interest relevant to this chapter to disclose.

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