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Case Report: Internet Gaming Disorder Associated With Pornography Use

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Internet gaming disorder (IGD†) is not currently a recognized diagnosis in the *Diagnostic and Statistical Manual for Mental Disorders-5* (DSM-5). However, IGD has been noted to warrant further research for possible future inclusion in the DSM. In many ways, IGD strongly resembles substance and gambling addictions. Such characteristics include tolerance, withdrawal, and social and occupational neglect resulting from increased time invested in video game use and acquisition. The use of similar or closely related media is also seen, which mirrors the natural course of substance and gambling addictions. We present a case of a 22-year-old man who exhibited IGD and problems associated with pornography use. This case report exemplifies the sequelae of IGD. Our paper also reviews the possible mechanisms of behavioral addiction, as well as the status of IGD as a potential subcategory of behavioral addiction. Additional research is needed to determine if IGD co-occurs with problematic use of pornography.

INTRODUCTION

Pathologic Use Versus Addiction

Social and occupational impairment resulting from excessive video game use has been frequently described as "pathologic" [1-3]. Use of the term "video game addiction," on the other hand, is more controversial. The social and biologic implications suggested by the word "addiction" include physiological dependence, tolerance, and withdrawal, potentially requiring rehabilitation and counseling. Consequently, the existence of behavioral addictions in general has been questioned because it is more difficult to prove that individuals can be "addicted" to activities themselves [4,5]. Instead, it has been proposed that certain individuals already possess a predisposition toward addictive behavior, which may not reflect the inherent qualities of any one activity, but instead may be indicative of a primary psychiatric disorder [4,6]. This notion is supported by studies suggesting that addictions are moderately to highly heritable through genetic variables [7].

However, while drugs such as cocaine have known mechanisms of action involving exogenous augmentation of dopaminergic neurotransmission through basic reward pathways, particularly within the mesolimbic system, it has been suggested that individuals with behavioral addictions undergo a similar process [8]. In these cases, it is proposed that certain activities cause psychological stimulation of the hypothalamus-pituitary-adrenal (HPA) axis and endogenous dopaminergic reward pathways resulting in a pattern of abuse and behavior as seen with substance abuse [9]. Therefore, activities such as gambling and video gaming may have inherently addictive properties because of operant conditioning. Operant conditioning refers to the way the consequences of our actions will either inhibit or reinforce the behaviors. If the individual feels rewarded, he or she is more likely to engage in that behavior again. B.F. Skinner's research

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†Abbreviations: IGD, Internet gaming disorder; DSM-5, Diagnostic and Statistical Manual of Mental Disorders-5; HPA, hypothalamus-pituitary-adrenal; fMRI, functional magnetic resonance imaging; CBT, cognitive behavioral therapy.

Keywords: Internet gaming disorder, video game addiction, pornography

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demonstrated that when the reward becomes unpredictable (known as intermittent reinforcement) but frequent enough, this has the strongest effect on increasing the behavior. This is the primary principle at work in gambling and one of the most important principles in video gaming. In addicted gamblers, there is a diminished HPA response, implicating physiological change associated with addictive behaviors associated with the down-regulation of the HPA pathway [10].

For many researchers, the above observations can be a slippery slope, since by this description almost anything can become "addictive" if it is found to be remotely pleasurable or rewarding. However, functional magnetic resonance imaging (fMRI) studies indicate this might be the case. For example, fMRI studies show that individuals who meet criteria for behavioral addictions exhibit decreased BOLD signals through the frontal cortex and increased BOLD signals through the nucleus accumbens, implying diminished impulse control and increased activation of reward pathways, respectively [11]. These findings are also observed in individuals who meet criteria for substance addiction [12-14].

The idea that similar structural abnormalities are seen in the context of both substance and behavioral addictions suggests that their respective pathophysiological mechanisms may be similar [15]. Given these underlying molecular mechanisms associated with addiction, it is not surprising that individuals with IGD share behavioral similarities with patients struggling with substance abuse, exhibiting psychological triggers, cravings, and addiction-seeking behaviors. Thus, it is not uncommon for addictive behaviors to be co-occurring [16]. Given genetic influences and environmental conditioning, true addiction to activities such as video games may be possible. This includes activities that are rewarding through negative reinforcement as well, where an individual can avoid an undesired reality by engaging in an alternative one. Nevertheless, more research is needed in the field of behavioral addiction to investigate the addictive potential of various activities with high abuse rates. Pathologic video game use, video game addiction, and IGD are terms often used interchangeably, but for now, it is proposed that overuse of any activity can be appropriately described as "pathologic" if it interferes with daily function [17].

Internet Gaming Disorder (IGD)

Despite the debate over semantics, the number of publications related to IGD is rapidly increasing [1,5,18,19]. This may be due to the amount of retrospective data that has become available within the past 3 decades, since video games are a relatively new cultural phenomenon. The first video game in history is thought to be "Tennis for Two," a cathode ray tube-based game invented by physicist William Higinbotham in 1958. Since then, advances in technology and the Internet have vastly accelerated the production and availability of video games [18]. According to the NPD Group, a marketing research company, video games grossed $15.4 billion in 2013 in the United States alone [20]. The rising appeal and popularity of video games may be attributed to the immersive experience they produce [21]. Unlike Higinbotham's "Tennis for Two," modern video games have incorporated rapidly improving graphics and visual stimuli with complicated plot sequences and multiplayer capabilities, allowing peers to interact with each other through media. Users can engage in alternative realities, where intermittent rewards for accomplishing various tasks gain both intrinsic and extrinsic value within the gaming culture [22]. In this way, video games reinforce their own use in the same way slot machines keep players engaged.

In fact, it has been noted by multiple researchers that video games and slot machines share similar characteristics, and if there is an addictive quality to video games themselves, it may be explored through comparison with gambling addiction [23]. In 1996, Dr. Kimberly Young used this connection to propose that problematic computer use might meet criteria for addiction [2]. There are now multiple scales based on the criteria for gambling addiction that aim to qualify and quantify computer use for research on the topic of pathologic gaming [24]. These scales include, but are not limited to, Young's Internet Addiction Questionnaire, Ko's Internet Addiction Scale, and the Chen Internet Addiction Scale [25]. Subjective scales such as these have played a large role in recent research on the topic of "video game addiction," which has gained publicity due to increasing incidences of pathologic use resulting in neglect of major life areas such as occupation, self-care, and interpersonal relationships [1,18,19].

The DSM-5 first acknowledged IGD in 2013 [26]. However, it was incorporated into the appendix and not formally listed as a diagnosis since more research is needed regarding its pattern of comorbidity, course, outcome, and treatment [17]. Nevertheless, current studies suggest that multiple problems are associated with excessive video game use such as obesity, violence, anxiety, lower school performance, social phobia, and depression [27,28]. Additionally, certain risk factors for becoming a pathologic gamer have been identified, including lower initial social competence and greater impulsivity [18]. Adolescents often fit this profile, and unsurprisingly, studies in developmental neurocircuitry indicate that adolescents have increased vulnerability to addiction [29]. Because video games are frequently marketed to appeal to this demographic, their widespread popularity is unsurprising [30]. Interventions based on future research in this field may be valuable, though they may also significantly affect the video game industry.

Cases such as the one presented in this report clearly exemplify a pattern of behavior closely resembling that seen in substance and gambling addiction as they are defined in the DSM-5. Such manifestations include tolerance and withdrawal, as well as social and occupational impairment. Other Internet applications are similarly stimulating; that is, the principle of intermittent reinforcement for actions taken while online can lead to problems of use,

especially when combined with other rewards (for example, sexual or romantic stimulation). In the case presented here, online pornography was also used by this individual and contributed to his pattern of addiction. There are numerous video games with sexual themes, such as the Grand Theft Auto and God of War games, in which players interact sexually with prostitutes and women characters. Thus, video games with sexual themes and pornography can be considered closely related media [31]. The purpose of this case study is to initiate a thought-provoking discussion regarding the way clinicians and researchers approach the topic of IGD and its management.

CASE DESCRIPTION

A 22-year-old first generation South Korean male with past psychiatric history of major depression with anxious features presented to the mental health clinic at reSTART because his compulsive video game use had progressively interfered with his interpersonal relationships and motivation to work. He began playing video games at age 6 in the context of physically and verbally abusive parenting. Initially he played an hour on weekdays and up to 5 hours on the weekends, with strict time limitations set by his parents. He was the only son in the household, and he was expected to earn placement at a prestigious university by achieving high academic marks throughout grade school. As a result of these circumstances, his social interactions with peers were exceptionally limited, and time spent outside of the home was strongly discouraged. Other than dating one female in secret for a brief period of time and running on the cross-country team, he spent most of his time indoors and increasingly resorted to video games, pornography, and anime for entertainment and sexual release.

Within a week of going to college, he became engrossed with the Internet gaming culture and played online video games 10 hours daily while maintaining minimal grades in order to pass his classes. He spent the subsequent 2½ years withdrawing from classes he could not complete as a result of his gaming habit. During his second year of college, he moved into an apartment with other gaming colleagues and was playing 14 hours daily of online video games, such as first-person-shooters and role-playing games. The patient shared: "I began practicing my gaming skills in Counter-Strike even when my hands hurt, and I no longer wanted to play for fun anymore. This is when I first began failing classes and started withdrawing from school midway through the quarter to avoid being dropped from enrollment." He created false transcripts in order to receive financial support from his parents, but after 3 years he was expelled from the university. His family became aware of his actions and stopped assisting him, so he moved into a small room in a low-income apartment complex where he depleted his savings playing video games, paying rent, and subsisting on Chinese food and pizza takeout. During this time, the patient was playing primarily the online role-playing game The World of Warcraft 16 to 17 hours daily. The patient shared with us: "This was undoubtedly the worst my gaming addiction has ever been and was also the darkest time in my entire life. I recall an ever-present fear and oppressive weight on me during those days, that if I peeled back from the haze of those [daily] 16 to 17 hours of gaming, my thoughts would immediately turn toward the ruined life I had made for myself, the contempt of my peers, my dwindling finances, and the rats. The ramshackle old house was so poorly maintained that it was fairly infested with rats. I recall that they used to climb up my monitor cables while I was playing sometimes, and I grew accustomed to shutting out the sound of squeaking and rummaging around in my trash cans as I was drifting off to sleep at night. I would close my eyes and try desperately to not think of my present reality." This lifestyle was not financially sustainable, however, and it was at this point that he presented to the mental health clinic, depressed with suicidal ideation and expressing his desire to decrease his video game use so he could get a job.

During his sessions, he refused to attempt abrupt and complete cessation of video game use, and the concept of doing so evoked immense anxiety and irritability. Instead, he opted to gradually discontinue his involvement with video games by stepping down the number of hours of daily play. His treatment goal was to reduce video game use in order to obtain a job, but due to years of social isolation while gaming, his social anxiety was worse than before gaming. Utilizing the criteria proposed by Gentile, he fit the criteria for IGD by answering yes to all 11 questions [1]. With applied cognitive behavioral therapy (CBT) and psychotherapy for 2 years, he was eventually able to acknowledge his video game addiction, stop gaming, and manage his depression without medication. He was able to establish a more regular diet and sleep schedule. He returned to the university, where his social life and academic performances satisfied him. After several experiences of playing video games and seeing how they interfered with his ability to perform academically, he resisted his gaming urges by keeping his computer at his parents' home.

Despite developing new friendships, he never dated again. Pornography had become his primary source of psychosexual stimulation. Though his use of pornography never interfered with his occupation or other activities of daily living, his lack of engaging in a romantic relationship with another person was a mild to moderately distressing matter to him. Due to the personal nature of the issue, he was less willing to discuss it in therapy, which became an unexpected obstacle in his case management over time.

DISCUSSION

The American Psychiatric Association's nine proposed criteria for IGD were based on preliminary research, which compared video game use to gambling addiction [1,32]. These criteria include the following:

• pre-occupation with video games;
• tolerance manifested by increasing amounts of time invested in video game use;
• escape of adverse moods through video game use;
• loss of relationships/opportunities as a result of video game use;
• reduced participation in other activities as a result of video game use;
• deceit in order to continue video game use;
• continued video game use despite adverse consequences;
• difficulty reducing video game use;
• withdrawal (manifested as restlessness and irritability) upon discontinuation of video game use.

According to the DSM-5, patients with IGD should exhibit clinically significant impairment in five or more of the above criteria in a 12-month period. Clinically significant impairment is determined by the manifestation of daily living dysfunction resulting in severe social, emotional, or work-related problems. The patient described in this case study met all of the criteria for diagnosis under this proposed definition of IGD. His use of video games began as an escape from the pressure of family expectations and increased over time (from 1 to 2 hours of daily play before college and increasing to 16 to 17 hours of daily play before seeking treatment). His preoccupation with video games resulted in poor academic performance and financial distress. Furthermore, his attempt to conceal his gaming use and its consequences ultimately resulted in loss of family ties, but he still continued to use. He gave up school so he could continue gaming, and when he finally sought help because he could not reduce gaming use on his own, he struggled with anxiety and irritability consistent with withdrawal systems. However, it is important to note that the patient has a previous history of anxiety, which makes it difficult to determine the degree of anxiety associated with IGD. These symptoms prevented him from stopping completely, and instead he required gradual cessation. It is important to address that there are only a limited number of hours in each day, combined with the nature of gaming itself, and perhaps the limited number of hours would seem to impose a ceiling on gaming behavior. This limitation in time may prevent individuals from escalating video game use in the same way patients might gamble larger amounts of money or take larger doses of a substance.

This case exemplifies the complexity of psychosocial factors that perpetuate pathologic gaming behavior. The patient in this case report began playing video games at a young age, which is a vulnerable time for both social development and addiction. Furthermore, given the immersive nature of modern gaming, the patient was likely reinforced by the escape video games provided from his rigid parenting structure, in addition to the satisfaction players feel when they advance levels or complete tasks. Pleasure and excitement associated with video games involve physiological arousal and stimulation of the HPA axis, resulting in increased heart rate, blood pressure, and sympathetic tone [9]. Arousal to video gaming can be observed in the brains of video game addicts using fMRI scans [33,34]. Moreover, video games, building on the principles of social interactivity, increased immersion, and seemingly endless achievements, are postulated to be neurologically and physiologically arousing [21]. For instance, built-in music adds to the immersive environment of the video game, stimulating the HPA stress response and release of cortisol [35]. Playing the game Tetris® competitively with other human players results in higher levels of testosterone when cortisol levels are low in men [36]. In our patient, he demonstrated attraction toward the Internet gaming culture and playing with others, and perhaps the arousal associated with playing with other people contributed to his addiction toward Internet video gaming. While IGD appears to affect large numbers of males, this may be due to the type and nature of the games available [37]. In the present case, there was no known familial history of addiction, though this should be reviewed given the genetic variables that contribute to addictive behavior. In addition, it is important to note that the patient's social anxiety and dysfunction may have contributed to the patient's excessive use of video gaming and development of IGD.

Human beings practice who they want to become, and individuals must be careful what they practice and how they program their brains. When a young child spends too much time in Internet gaming or pornography, there can be significant problems associated with excessive use [37-43]. We propose an analogy to clarify how a child's nervous system may develop when exposed to excessive time engaging in Internet gaming or other Internet activities. Observe your left hand. The thumb will represent the cortical areas associated with all the benefits of video gaming and use of technology: quick analytical skills, improved hand-eye-coordination, and perhaps improved reflexes. The index finger will represent the cortical areas associated with communication skills. The middle finger will represent behaviors associated with social bonding with family and friends. The ring finger will represent the capacity to recognize emotions of both self and others (empathy). Lastly, the little finger will represent the cortical areas associated with self-control. While these higher executive functions are biologically based, they are not fully expressed without proper practice and feedback. When a child spends an average of 7h 38m in front of a digital screen for entertainment [44], that child is exceeding the recommended daily dosage for healthy screen time [45]. Folding the fingers into the palm of your hand represents this situation. As the brain matures, the possible end product is a young adult who is all thumbs in their thinking: possessing quick analytical skills and quick reflexes, but not as developed in communication skills, having few bonds with people, exhibiting little empathy, and showing minimal self-control. Therefore, IGD in young children may result in significant problems later as adults. Further

research exploring the ramifications of excessive exposure to video games and pornography in children is warranted.

CONCLUSIONS

Even though the patient eventually overcame his gaming disorder, he still struggled to engage in meaningful romantic relationships and instead used pornography as a sexual outlet. This is particularly interesting, since one of the criteria listed in most substance use disorders is "use of similar substances." This patient's use of pornography may be considered use of similar media. Additional research exploring the co-occurrence of IGD and problematic use of pornography would be interesting. Also, it would be interesting to determine the digital potency of different forms of digital media, pornography, and video games to determine their ability to stimulate HPA activation, brain dopamine release, and neuroendocrine arousal. Furthermore, it is difficult to tell if the patient's social anxiety was the result of years of social isolation secondary to video game use or if his affinity for video games initially began as avoidance of social situations. Either way, from a management perspective, it is important to identify the potential comorbidities of IGD, including social anxiety, depression, and pornography use. Patients are less likely to be forthcoming about pornography use due to the sensitive and personal nature of the subject, and if not addressed with potentially co-occurring social anxiety, this issue may become insidious and difficult to treat. Finally, mental health professionals at colleges and universities should be aware of the signs and symptoms of IGD in order to identify students suffering from the problematic use of video games.

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