Problem Gaming:

A Short Primer

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Abstract

As the popularity of video games has risen so too has the worry about the problems associated with playing them. The authors review the research concerning problem gaming, its similarity to some clinical addictions like gambling and drug and alcohol abuse, and current treatment options. They conclude that, regardless of how researchers and medical professionals assess the nature of a gaming disorder, few who play video games experience negative consequences from doing so and, at best, only a small subset of players might be considered to suffer from an addiction to it.

Keywords

addiction; internet gaming disorder; problem gaming; video games

The Rise of Video Games

VIDEO GAMES ARE NOW one of the dominant forms of entertainment in the modern world. According to recent estimates, over 1.2 billion individuals play video games worldwide, and over 150 million of these individuals live in the United States. These game players represent a wide variety of demographic categories. For instance, although the common stereotype depicts video gamers as young males exclusively, in fact 44 percent of gamers are female, and 27 percent are older than fifty (Entertainment Software Association 2015). Yet indisputably, video games are disproportionately popular among younger individuals. Ninety percent of teens play video games; boys aged eight to eighteen play an average of sixteen hours a week, and girls the same age average nine hours per week (Gentile et al. 2009).

As the popularity of video games has risen, so too has the amount of scientific research dedicated to investigating the effects of video game play. Researchers have explored the effects of video games from the perspective of essentially every subspecialty within psychology—including cognitive psychology, social psychology, developmental psychology, and clinical psychology. Perhaps not surprisingly given this breadth of research, the findings are complex, with the positives and negatives varying depending on the type of video game under investigation and the type of questions asked.

For instance, the majority of studies in cognitive psychology have found a positive relationship between playing a particular type of video game—action video games—and perceptual and cognitive abilities. The benefits associated with action video game play

include everything from faster response times to improved vision to greater ease switching among tasks. Critically, these outcomes are not seen as a result of playing all video games. Indeed, many types of video games—in particular those lacking action content—appear to confer few if any benefits compared to the benefits conferred by video game play that does involve action (Spence and Feng 2010; Dale and Green 2017).

The same basic trend—in which the impact of games depends on the types of games played—seems apparent for social psychology as well. Here, research links the playing particular types of heroic or helping games to a number of pro-social outcomes, including increases in empathy and helping behaviors (Gentile et al. 2009; Greitemeyer and Osswald 2010; Greitemeyer and Mügge 2014; Prot et al. 2014). Conversely, other research has linked playing specific types of violent and aggressive video games to a number of antisocial outcomes, including increases in aggressive thoughts, feelings, and behaviors (Anderson et al. 2010; Gentile et al. 2014).

Finally, clinically there has been interest in a variety of possible disorders, including problematic gaming (Gentile et al. 2009), which is the focus of this article, as well as in a possible link between video game play and Attention Deficit Hyperactivity Disorder (ADHD) (Gentile et al. 2012; Swing et al. 2010).

The research on problem gaming—still in its infancy as reflected in figure 1—has accelerated rapidly over the past decade. Far from complete, this research has shed a great deal of light on an important issue.

Addiction—Conceptualization and Measurement

Diagnosing mental disorders presents a different challenge than diagnosing, for instance, bacterial infections or broken bones. Indeed, for most mental disorders, no analogue exists for a diagnostic blood test or x-ray. Instead, mental disorders are inherently experiential. Thus, diagnosing a mental disorder relies, at least to some extent, on self-reports. Because they do and because there are often enormous differences in individuals' internal experiences of the world, it can be difficult to determine where the diagnostic line should be drawn for a mental disorder. In general, though, whether an experience is classified as a disorder depends on where it falls within four key dimensions—deviance, distress, dysfunction, and danger. (In psychology textbooks these are sometimes referred to as the 4Ds of psychopathology.)

The first dimension—deviance—refers to the rarity of the symptoms or experience. Greater deviance (i.e., greater deviations from the norm) increases the likelihood that symptoms or experience will be classified as a mental disorder. For instance, nearly every human at some point will experience feelings of guilt, sadness, or irritability, have difficulty concentrating, have problems with sleep, and so on. Much less commonly, individuals experience these symptoms daily over a period of two weeks or more. Those who experience a congruence of several symptoms over a long period thus register higher in deviance and are more likely to be diagnosed with a mental disorder (in this case, major depressive disorder). The second dimension—distress—refers to the extent to which a disorder causes suffering or pain in an

individual. If a set of symptoms or experiences, even if they are rare, causes no distress in an individual, he or she will be less likely categorized as someone with a mental disorder. The third dimension—dysfunction—refers to the extent to which the experiences negatively affect the life of an individual (e.g., his or her social life, school life, or work life). Again, if the symptoms or experiences do not affect an individual's life negatively, it is less likely he or she will be classified as suffering from a disorder. And finally, the fourth dimension —danger—refers to the extent to which the symptoms or experiences are associated with physical harm, either to an individual or to others he or she encounters (Davis 2009). All four Ds do not need to be present for them to be considered clinically significant, and indeed, many clinical diagnoses are based primarily on dysfunction because it has such clear consequences for an individual's quality of life.

Currently, a major issue in the video gaming world concerns how to assess whether there exists a subset of individuals for whom video gaming creates distress or dysfunction. Here we should note that problematic gaming is not yet a fully validated disorder according to the most recent (2013) version of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5).* Published by the American Psychiatric Association, the *DSM-5* provides the standard criteria used by clinicians in the United States in classifying mental disorders. The *DSM-5* refers to problem gaming as "internet gaming disorder" (IGD) (researchers in the field have used many different terms, e.g., video game addiction [VGA], pathological gaming, gaming disorder, and problematic gaming; in this article, we will alternate between the latter two terms) and lists it as a condition warranting further study. Notably, the addition of IGD to the further study section has generated much debate (Griffiths et al. 2016; Király et al. 2015a). Recently, the study of gaming disorder is largely based upon a conceptually similar disorder, one that does appear in the DSM-5—gambling disorder. [In June 2018, the World Health Organization (WHO) added to the proposed eleventh edition of its *International Statistical Classification of Diseases and Related Health Problems* or *ICD-11* gaming disorder as a mental health condition—*the editors.*]

The signs of distress and dysfunction symptomatic of gambling disorder include jeopardized relationships or lost educational and career opportunities, lying to conceal losses or involvement with gambling, preoccupation with gambling during nongambling hours, unsuccessful attempts to decrease the amount of gambling or quit it entirely, and restlessness or irritability during such attempts (*DSM-5*). The same basic symptoms show up in most surveys of problem gaming.

For instance, in the section of the *DSM-5* on gaming disorder, there are nine suggested criteria: a preoccupation with video games, such as frequently thinking about them even when not playing them; withdrawal symptoms during attempts to stop playing or during periods without the opportunity to play; the buildup of tolerance leading to a need to spend more time playing video games; unsuccessful attempts to curtail or to stop playing; a loss of interest in other, previously enjoyable activities; the urge to continue playing online games despite an awareness of significant problems; lying to others about the frequency of play; using online games as a means to escape bad moods or real-life problems; and failed relationships or lost job opportunities due to excessive online game play. Questionnaires have been modeled after these criteria that typically ask individuals to respond with "yes,"

"no," or "sometimes" to queries about experiences with the criteria over the past year. Those who meet at least five of these criteria are typically considered to suffer from gaming disorder. However, some aspects of the classification system are still under development or up for debate, such as how to interpret the third response.

Notably, the number of hours an individual spends playing video games is not one of the diagnostic criteria. An individual who plays video games for a significant amount of time, but who experiences none of the types of distress or dysfunction we have mentioned, would not be considered to have gaming disorder. Meanwhile, an individual who plays for a seemingly small amount of time, but who does experience at least half of these types of distress or dysfunction, would be considered to have IGD. This is of particular relevance for parents, whose worries regarding their children's game playing (i.e., "is my child addicted to video games") often center around the amount of time the child plays video games, rather than the question of whether the game playing is causing negative outcomes in the child's life or internal state.

Prevalence

As we have said, the number of people who play video games worldwide is enormous. Thus, one key question for researchers has been whether the signs and symptoms associated with IGD are truly deviant. In other words, do we find these symptoms of distress and dysfunction only in a small portion of all of the individuals who play video games?

The prevalence of IGD has been measured by many different research groups. A number of studies find a prevalence rate in the 5 percent range (see figure 2). This estimate, however, varies significantly from study to study. For instance, one study in Germany found that only 0.5 percent of 600 respondents fourteen to sixty years old qualified (Schmidt et al. 2011) while a second study in Germany found that 1.2 percent of 11,000 respondents thirteen to eighteen years old could be classified with gaming disorder (Rehbein et al. 2015). On the other end of the spectrum, a study found 8.7 percent of around 3,000 respondents in Singapore eight to fifteen years old met the criteria for problem gaming (Choo et al. 2010). In the United States, large-scale studies have found prevalence rates ranging from 4.9 percent in 4,000 fourteen to eighteen year olds (Desai et al. 2010) to 8.5 percent in a national sample of 1,000 eight to eighteen year olds (Gentile 2009). (See Petry and her colleagues [2015] for a more thorough review of gaming disorder prevalence rates).

The extent to which the variability observed across studies represents differences in the populations sampled (e.g., true differences in prevalence in Germany, Singapore, and the United States) is difficult to determine. Because the inclusion of gaming disorder in the *DSM-5* occurred relatively recently, after much of this research was conducted, many of these researchers used questionnaires or categorization schemes (regarding, for example, the number of symptoms an individual needed to display to be classified as a problem gamer) that did not always comport with the current *DSM-5* criteria (see Király et al. 2015a for a comprehensive review of the assessment issues for problematic gaming). Basically, though, the existing research suggests that gaming disorder is reasonably rare (i.e., deviant) and not necessarily a consequence of video game play. Interestingly, the typical range of prevalence

estimates match well with other forms of addictions including substance abuse, which—if you consider both drugs and alcohol—afflicts about 8 percent of adults older than eighteen in the United States) (Hedden 2015).

Negative Outcomes

Because one of the symptoms queried on most gaming disorder questionnaires relates to dysfunction in school or work performance, many researchers express interest in whether the data gathered by them is observable. In other words, are there actual, quantifiable differences in the scholastic performances of children categorized as suffering from problem gaming and those who are not?

To address this question, Choo and colleagues (2010) conducted a large-scale survey of young gamers in Singapore. They found that those individuals classified as suffering from gaming disorder had, on average, poorer grades in English, math, science, and second-language classes than their peers who were not so classified. The authors also found that the individuals suffering from problem gaming were more prone to skip school or arrive late to class. Importantly, these correlations remained significant even after the authors controlled for the amount of time that respondents spent playing video games. In other words, poorer scholastic performance was not attributable merely to playing video games— many children played video games regularly and performed normally in scholastics. Instead, poorer scholastic performance appeared only in children whose gaming was associated with problem gaming.

Other researchers (Skoric, Teo, and Neo 2009) found similar results with a group of elementary students in Singapore. Their video game use in general had no negative effects on scholastic performance (and in some cases, it had positive effects). However, problem video game play correlated with lower English, math, and science test scores. Interestingly, these researchers also examined the effect of video game engagement, a measure of the amount of cognitive effort put into video gaming and the euphoria derived from it. They found that engagement did not relate to academic outcomes. This suggests that not only is playing video games in itself unassociated with negative scholastic outcomes, being differentially motivated by video games is also unassociated with such outcomes. Schmitt and Livingston (2015) found problem gaming among college students predictive of both lower expectations for college engagement and lower college grade point averages, even when controlling for high school grade point averages.

Stability over Time

The vast majority of the research on video game addiction relies on single time point correlational studies. Although such studies can reveal the correlations among video game addiction and other psychological and social behaviors, they insufficiently address whether video game addiction remains stable over time. A few studies have, however, measured IGD symptoms in the same individuals at successive points in time.

Gentile and colleagues (2011) conducted a longitudinal study that tracked gaming disorder symptoms in approximately 3,000 elementary and secondary school students in Singapore

over the course of two years. Their study found the symptoms to be fairly stable over time. In fact, 84 percent of the students classified as addicts at the beginning of the study still warranted classification as problem gamers two years later. Other studies have found different degrees of behavioral stability. Van Rooij and associates (2011) reported about a 50 percent resolution rate over one year. Rothmund, Klimmt, and Gollwitzer (2016) assessed video game addiction in a sample of German adolescents twice a year apart and found that only 27 percent of their sample classified as pathological gamers both times. This discrepancy could arise from the cultural differences between gamers in different countries or from the fact that the studies used different age groups. Further complicating the issue, little research has examined the general test-retest reliability of common video game addiction measures, thus making it difficult to distinguish between changes in VGA scores over time and the natural variability that occurs when individuals fill out the same questionnaire a second time. Lemos, Cardoso, and Sougey (2016) found a reasonable test-retest correlation of 0.77, though there was a statistically significant difference between the two points in time, and Groves and associates (2015) also found a test-retest correlation of .80.

Profile of Problem Gamers

Scientific conversations about gaming disorder center on the characteristics of individuals classified as problem gamers. This line of research is correlational by necessity, because it would obviously be unethical to run an experiment in which researchers randomly assigned some individuals to become problem gamers. This ethical issue can be circumvented to some extent, however, by conducting longitudinal studies that allow researchers to collect data from individuals at several points and analyze how variables of interest change over time in order to make limited inferences about causality.

One study did exactly this, measuring video game addiction in youth gamers several times over a two-year period (Gentile et al. 2011). After all data had been collected, the researchers split this large sample into four groups: those classified as addicts at the beginning of the study who remained addicts two years later; those classified as nonaddicted throughout the course of the study; those classified as addicted at the start of the study and nonaddicted at its close; and those who began the study classified as nonaddicted but became classified as addicted by its end. These changes or lack of changes over time allowed the researchers to address the likely causal links between video game addiction and various predictive factors for an individual becoming addicted. They identified excessive video gaming, higher impulsivity scores, and lower social competence scores as risk factors for students becoming addicted, meaning that nonaddicted individuals with high impulsivity or low social competence at the beginning of the study were more likely to classify as addicts by the end of the study than were nonaddicts who did not have high impulsivity or low social competence scores at the beginning. The researchers found heightened depression and anxiety, social phobias, and poor grades more likely to result from addiction than to cause it. We should note, however, that although the longitudinal nature of this study allowed researchers to address the causality of the variables of interest to a certain degree, the fact that the experimenters could not actually control any of the variables makes it possible that these relationships are driven by an underlying cause rather than being causally

related to each other. Nonetheless, it is worth noting that numerous other studies have also identified associations between video game addiction and impulsivity, and in some cases, adult attention deficit disorder (e.g., Ko et al. 2009; Weinstein and Weizman 2012; Yen et al. 2016).

The broader scientific inquiry into the primary motivators that cause so many people to play video games has yielded several distinct but related theories about gaming motivation. One of the earlier frameworks suggested that there are three independent components motivating individuals to play video games—achievement within games, socializing with other players, and immersion within games (Yee 2006). But this model was based entirely on massively multiplayer online role-playing games (MMORPG), one of the more popular genres of online games. An alternate framework was developed by Demetrovics and colleagues (2011). They proposed and statistically validated seven motivational factors—social, escape, competition, coping, skill development, fantasy, and recreation. Importantly, the data used to generate this model came from players of a wide variety of different online game genres, thus making the model more general.

Numerous studies have suggested that the motivations for gaming do not all relate equally to the tendency to become addicted to video games. One such study (Zanetta Dauriat et al. 2011) used a large-scale survey of MMORPG players and found that the strongest motivational predictors of internet gaming addiction were achievement and escapism. In this context, achievement means the desire to advance and progress in the game, develop a deep understanding of the game mechanics, and compete with other players. Escapism, a component of immersion, means the tendency to play games to avoid real-life problems or to distract oneself from them. The amount of time individuals spent playing online games was also found to correlate significantly with addiction. Recently, Kiraly and associates (2015b) found similar results. They tested a mediation model with structural equation modelling and demonstrated a significant link between two gaming motivations —escapism and competition, which is similar though not identical to the achievement motivation described previously—and problematic gaming. Furthermore, this link mediated the relationship between general psychiatric distress and problematic gaming.

Going a step further, Billieux and colleagues (2015) used a form of cluster analysis, a statistical technique that allows researchers to separate a large number of individuals into distinct groups, or clusters, on a dataset of more than 1,000 French players of *World Of Warcraft (WoW)*, one of the more popular MMORPG games. The analysis divided the *WoW* players into five distinct clusters, three of them identified as clusters of pathological or addicted gamers. The first of the three pathological clusters, called unregulated escapers, consisted of gamers highly motivated by escapism but not achievement, low self-esteem, and high impulsivity. The second problematic cluster, labeled unregulated achievers, consisted of players highly motivated by in-game achievements, who were also highly impulsive, and who had little interest in the role playing and socializing involved in the game or in its immersive and escapist aspects. The third problematic cluster, indentified as hard-core gamers, reported the largest number of adverse consequences from online gaming, the most hours spent gaming, and the greatest in-game achievements. Members of this cluster were motivated by both escapism and in-game advancement. Like the other two pathological

clusters, members of this more severe cluster reported high impulsivity—but, unlike those in the other two groups, their impulsivity was driven by sensation seeking.

Characteristics of Addicting Games

The research we have described investigated the effects of individual differences on problem gaming. A separate but closely related body of research has focused on the differing influences of specific video game genres on the likelihood of gamers developing problems.

One such study (Eichenbaum et al. 2015) surveyed over 4,000 undergraduate students, questioning their game-playing habits and internet gaming disorder symptoms. The total percentage of individuals surveyed show enough symptoms of addiction to qualify as being problem gamers as found in the broader literature, but here the researchers also found an interaction between the type of video games the respondents tended to play and their likelihood of being problem gamers. Those engaged in role-playing games and real-time strategy games proved the most likely to display symptoms of addiction. They were followed by action gamers. Then came players of other game genres like phone games. Interestingly, this study found the relationship between the amount of time spent playing video games and the likelihood of displaying gaming-disorder symptoms strongest for those who played between five and ten hours a week. After ten hours, this relationship became much weaker, suggesting that the difference between playing four to eight hours per week is more significant for the likelihood of addiction than that between fourteen and eighteen hours. Again, we should mention that studies of this nature are not able to address the causality of problem gaming. Perhaps role playing and real-time strategy games offer more compelling rewards than the games of other genres, and thus their players are at a greater risk of developing problems. Perhaps individuals attracted to role playing and real-time strategy games more likely have particular traits that put them at greater risk for the disorder.

Another recent study (Lemmens and Hendriks 2016) examined the relationship between gaming disorder and game genres, as well as the differences between playing games online and off-line. It found that playing online and off-line games (which, in many cases, could be the same game) significantly related to the occurrence of problem-gaming symptoms, though online games had a much stronger correlation. Respondents who indicated at least five symptoms were three to four times more likely to report playing online-role role-playing and shooting games than they were to report playing other genres.

Comorbidity with Other Disorders

Gaming disorder, as currently portrayed in the *DSM-5*, shares many similarities with other behavioral addictions, such as gambling addiction as well as various substance-abuse disorders like alcohol and nicotine addictions. There is growing evidence that individuals afflicted with one form of addiction are at greater risk for developing other addictions too (though see Przybylski, Weinstein, and Murayama 2016).

Numerous studies have found comorbid relations between problem gaming and alcohol use, and in fact some of these studies also examine nicotine and cannabis use. A large-scale study by Desai and colleagues (2010) surveyed over 4,000 school students from Connecticut

high schools. Although they found video game use in general to be unrelated to bad health, respondents who reported a sufficient number of problem-gaming symptoms to warrant classification as problem gamers proved far more likely to report smoking cigarettes, using cannabis, getting into serious fights, and depression. Another study (van Rooij et al. 2014) found similarly that gaming in general was not related to behavioral problems or bad health but that gamers with symptoms of problems reported higher rates of depression, loneliness, social anxiety, and low self-esteem. They were also nearly twice as likely to drink alcohol, ingest cannabis, or smoke nicotine. A study also found the same correlations among a large number of Japanese adolescents (Ko et al. 2009). Some argue that the relationship between problematic gaming and alcohol use in adolescents may be driven by increased impulsivity. Choi and colleagues (2014) compared the impulsivity profiles of small groups of individuals suffering from internet gaming disorder and alcohol abuse and found that both groups had much higher impulsivity scores than did a control group of healthy individuals. Additionally, those suffering from gaming disorder have been linked with greater cravings when compared to recreational gamers (Dong et al. 2017). Finally, Coëffec and colleagues (2015) found a negative correlation between problematic gaming and first substance consumption—individuals who started using alcohol or drugs earlier in life were more likely to be classified as problematic gamers in the future. (Again, we should note that studies of this nature are correlational by necessity.)

Although a comprehensive review of the neuroscience and genetic research on video game addiction lies far beyond the scope of this article, we find it worth noting that such research exists and is steadily growing—and that many of its findings suggest strong similarities between the neural and genetic underpinnings of video gaming and substance addictions (see Kuss and Griffiths 2012; Weinstein and Lejoyeux 2015; and Brand et al. 2016). Such studies have found that video game addicts and nonaddicts exhibit differences in neuroanatomical structures related to reward processing and impulsivity, neural activity concerned with rewarding stimuli, and the levels of neurotransmitters related to reward. There are also numerous genetic variants, many related to the prevalence of dopamine receptors, which have been implicated as risk factors for developing video gaming and various other addictive disorders.

Treatment Options

Designing effective methods of identifying and treating internet gaming disorder is a project of great importance. No clear consensus exists about the best practices for treating this form of addiction, and the research, while promising in some regards, is also quite limited (see King and Delfabbro 2014; King et al. 2017; and Yeun and Han 2016). Here, we briefly discuss some of the more popular methods to treat gaming disorder.

One of the most popular psychological treatments today for both substance and behavioral addictions is cognitive behavioral therapy (CBT). Typical applications of CBT involve training individuals who suffer from some psychological disorder to recognize when they experience negative symptoms (i.e., urges to engage with games or agitation from not playing) and reinterpret these symptoms more positively. Li and Wang (2013) recruited twenty-eight problem gamers and assigned half of them to a CBT treatment group, the other

half to a treatment group that underwent standard therapy sessions. Those in the CBT group had fewer pathological thought patterns after treatment than those in the control group. However, neither group showed an actual decrease in symptoms.

Bupropion, an antidepressant commonly used to treat various addictions, has also been used as a method to combat gaming disorder. Han, Hwang, and Renshaw (2010) administered bupropion to a small group of Korean males with strong problem gaming symptoms. After six weeks of treatment, the gaming disorder participants showed a significant reduction in depressive symptoms, in brain activity in areas related to reward processing, in self-reported game craving, and in problem gaming symptoms. This study was limited, however, by a small sample size (eleven gaming disorder participants) and the absence of a control group against which to compare the effects of using bupropion.

Conclusion

Problem gaming is a relatively new phenomenon, one which we are only beginning to understand. Although a great deal of scientific interest exists for this topic, various labs have taken different routes toward defining and classifying gaming disorder, thus making it difficult to compare studies directly and to draw general conclusions from the literature. It does, however, seem clear that—independent of how gaming disorder is assessed—only a small subset of individuals who play video games experience severe negative consequences.

Although research on gaming disorder grows at a steady pace, we still have much to learn about its underlying causes, as well as the long-term effects of problem gaming. Future studies would benefit from measuring symptoms in conjunction with other measures of interest over time, either for short time spans (i.e. weekly for a semester) or long ones (i.e. every six months for two years), which would allow us to elucidate better the causality and stability of this disorder.

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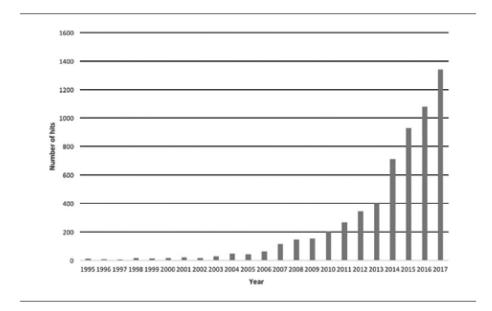
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Figure 1.
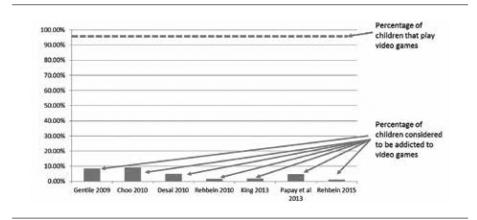Increase in research on problem gaming, 1995–2017

Figure 2.
Instance of internet gaming disorder as measured in several studies