

# Online Games, Addiction and Overuse of

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Since the early 2000s there has been a significant increase in the number of empirical studies examining various aspects of problematic online gaming and online gaming addiction. There is a lack of consensus as to whether video game addiction exists and/or whether the term “addiction” is the most appropriate to use. Some researchers use terminology such as “excessive” or “problematic” to denote the harmful use of video games. Terminology for what appears to be the same disorder and/or its consequences includes problem video game playing, problematic online game use, video game addiction, online gaming addiction, internet gaming addiction, and compulsive internet use. This entry uses the term “gaming addiction” to describe the phenomenon of excessive problematic gaming since there is demonstrable empirical evidence that such behavior can include all the core components of addiction including salience, mood modification, tolerance, withdrawal, conflict, and relapse (Griffiths, 2010).

## Precursors to Online Gaming Addiction

Following the release of the first commercial video games in the early 1970s, it took until the 1980s for the first reports of video game addiction to appear in the psychological and psychiatric literature. These early studies claimed the disorder was like any other behavioral addiction and consisted of a compulsive behavioral involvement, a lack of interest in other activities, association and friendship circles mainly with other video game addicts, and physical and mental symptoms when attempting to stop the behavior (e.g., “the shakes”). However, all of these

studies were observational, anecdotal, and/or based on case studies, primarily using samples of teenage males.

The 1990s saw a small but significant increase of research into gaming addiction with almost all of these studies being carried out in the United Kingdom and on adolescents, typically surveying children in school settings. However, all of these studies were self-report surveys and relatively small scale. The main problem was that all of them assessed gaming addiction using adapted versions of the criteria for pathological gambling in the American Psychiatric Association’s *Diagnostic and Statistical Manual of Mental Disorders (DSM)*. Although there are clearly many similarities between gambling and gaming, they are different behaviors and specific video gaming screening instruments could have been developed. Based on further analysis of the adapted *DSM* criteria used in these studies, this work was later criticized for being more likely to be assessing gaming preoccupation than gaming addiction (Charlton, 2002).

## The Rise of the Internet

The 2000s saw a substantial growth in the number of studies on gaming addiction particularly as gaming expanded into the online medium where games could be played as part of a gaming community, that is, massively multiplayer online role playing games (MMORPGs) such as *World of Warcraft* and *Everquest*. Approximately 60 studies were published on online gaming addiction between 2000 and 2010 and a vast majority of these examined MMORPG addiction and were not limited to the study of adolescent males (Griffiths, Kuss, & King, 2012). Furthermore, many of these studies were based on data collected online and a significant minority of studies examined various other aspects of gaming addiction using non-self-report methodologies. These include studies using polysomnographic measures and visual

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and verbal memory tests; medical examinations including the patient's history and physical, radiological, intraoperative, and pathological findings; functional magnetic resonance imaging; electroencephalography; and genotyping (Kuss & Griffiths, 2012).

Griffiths et al. (2012) reviewed the prevalence studies examining problematic gaming and gaming addiction from 1994 to 2012. The studies they selected were based on samples of at least 300 participants and used some kind of screening instrument to assess problematic gaming (rather than self-diagnosis). They reported that prevalence rates of problematic gaming ranged from 1.7% to over 10% among general samples. Prevalence rates among gamers were, in some cases, much higher (some as high as 17% to 34%). These studies indicated that, in general, males are significantly more likely than females to report problems relating to their gaming. The differences in methods of assessing gaming problems may partly account for differences in prevalence rates (King, Delfabbro, & Griffiths, 2012; King et al., 2013). Furthermore, many studies fail to assess prior problems (i.e., lifetime prevalence). King and colleagues (2012) also noted that some studies did not consider subclinical cases (i.e., meeting some but not all criteria for problematic use), and the presence of comorbid psychopathology was not routinely assessed.

Overall, there are some generalizations that can be made with regard to the demographic characteristics of gamers and problem gamers. The literature suggests that adolescent males and young male adults appear to be at greater risk of experiencing problematic video gameplay. However, the course and severity of these problems are not well known and the finding that this group is more at risk may be a consequence of sampling bias and the fact that this group plays online video games more frequently than other sociodemographic groups. It has also been suggested that university students may be especially vulnerable to developing problematic online gaming. Reasons for this include their flexible tuition and study hours, ready access to high-speed broadband on a 24/7 basis, and multiple stressors associated with adjusting to new social obligations and/or living out of home for the first time (King et al., 2012).

## Negative Consequences of Excessive Online Gaming

Irrespective of whether problematic video gameplay can be classed as an addiction, there is now a relatively large number of studies all indicating that excessive online gaming can lead to a wide variety of negative psychosocial consequences for a minority of affected individuals. In extreme cases, these can include sacrificing work, education, hobbies, socializing, time with partner/family, and sleep; increased stress; an absence of real-life relationships; lower psychosocial well-being and loneliness; poorer social skills; decreased academic achievement; increased inattention; aggressive/oppositional behavior and hostility; maladaptive coping; decreases in verbal memory performance; maladaptive cognitions; and suicidal ideation (Griffiths et al., 2012). In addition to the reported negative psychosocial consequences, Griffiths et al. also reported many health and medical consequences that may result from excessive gaming (both online and offline). These included epileptic seizures, auditory hallucinations, obesity, wrist pain, neck pain, blisters, calluses, sore tendons, and numbness of fingers, sleep abnormalities, and repetitive strain injuries. Taken together, this relatively long list of potential psychosocial and negative medical consequences indicates that excessive online gaming is an issue irrespective of whether it is an addiction. It also suggests that more extensive recognition by the medical community is needed of the wide range of potential negative and life limiting consequences of excessive gaming.

## Factors Associated with Problematic Gaming and Gaming Addiction

A number of studies have examined the role of personality factors, comorbidity factors, and biological factors, and their association with online gaming addiction. In relation to personality traits, gaming addiction has been shown to be associated with neuroticism, aggression and hostility, avoidant and schizoid interpersonal tendencies, loneliness and introversion, social inhibition, boredom inclination, sensation seeking, diminished agreeableness, diminished

self-control and narcissistic personality traits, low self-esteem, state and trait anxiety, and low emotional intelligence (Griffiths et al., 2012). Considering the relatively high frequency of co-occurring personality, comorbidity, and biological factors, it is hard to assess the etiological significance of these associations with online gaming addiction as they may not be unique to the disorder and further research is needed. Research has also shown online gaming addiction to be associated with a variety of comorbid disorders. These include attention deficit hyperactivity disorder, symptoms of generalized anxiety disorder, panic disorder, depression, social phobia, school phobia, and various psychosomatic symptoms (Griffiths et al., 2012).

Through use of functional magnetic resonance imaging (fMRI), biological research has found that gaming addicts show similar neural processes and increased activity in brain areas associated with substance related addictions and other behavioral addictions, such as pathological gambling (significant activation in the left occipital lobe, parahippocampal gyrus, dorso-lateral prefrontal cortex, nucleus accumbens, right orbitofrontal cortex, bilateral anterior cingulate, medial frontal cortex, and the caudate nucleus (Kuss & Griffiths, 2012). It has also been reported that gaming addicts (like substance addicts) have a higher prevalence of two specific polymorphisms of the dopaminergic system (i.e., Taq1A1 allele of the dopamine D2 receptor and the Val158Met in the catecholamine-O-methyltransferase), which suggests that, among some players, there might be some genetic predisposition to develop video game addiction (Kuss & Griffiths, 2012).

### Treatment of Problematic Video Game Use and Video Game Addiction

Clinical interventions and treatment for problematic and/or addictive video gameplay vary considerably in the literature, with most of the very few published studies employing some type of cognitive behavioral therapy (CBT), pharmacotherapy, and/or self-devised psychological interventions (King et al., 2011, 2012). The evidence base on the treatment of problematic and/or addictive online gaming is limited.

Furthermore, the lack of consistent approaches to treating problematic gaming and gaming addiction makes it difficult to produce definitive conclusions as to the efficacy of treatment, although the effectiveness of CBT (as with the treatment efficacy of other addictions) appears to be supported by preliminary evidence (King et al., 2011).

Problematic cognitions are thought to maintain problematic gaming behaviors. Research on gamers has identified several attitudes and beliefs associated with excessive playing behavior. These include the belief that no amount of time spent playing is “long enough” and that time spent playing produces a need to continue playing a video game until every level, reward, or feature is completed. Emotional responses associated with in-game rewards and completion of the video game encourage players to then seek out and begin playing new games, thus initiating a never ending cycle of playing behavior (King, Delfabbro, & Griffiths, 2010a). Other common cognitive beliefs among problem gamers include thoughts about gaining power and status through the game, thoughts of mentally escaping from the real world, and thinking of the computer as a companion or “electronic friend.”

The lack of comparative treatment studies might suggest that there is a general lack of demand for psychological services for problematic gamers and/or gaming addiction. However, this may not necessarily be the case. In Southeast Asia there appears to be significant demand for treatment for online related problems including gaming addiction. The South Korean government has reportedly established a network of over 140 counseling centers for treatment of online addiction (Kim, 2008). In Western countries, gaming addiction clinics have also started to emerge in places such as the Netherlands and the United Kingdom. There are also treatment groups that are modeled on 12-step self-help treatment (e.g., Online Gamers Anonymous). However, little detail is known about the treatment protocols or their efficacy.

In a review of internet and gaming addiction treatment, King et al. (2011) highlighted that most studies fail to employ an objective measurement of game usage to confirm participants' self-reported usage at baseline or following intervention. Another issue is that

many studies do not include a control group for between-group comparison. Treatment dose and duration also vary considerably across studies, for both pharmacological and nonpharmacological interventions. As a result, the lack of consistent approaches to treating problematic gaming makes it difficult to draw definitive conclusions as to the efficacy of treatment.

On May 1, 2012 the Substance Use Disorder Work Group of the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* proposed that internet use disorder, which primarily refers to maladaptive video gaming (or "Internet Gaming") behavior, should be included in Section 3 of the *DSM-5* ("Emerging Measures and Models") as the subject of further empirical inquiry (King et al., 2013). Publication of clinical criteria in a future *DSM* would facilitate and enhance standardization of research and treatment in the gaming studies field. It may also help to minimize the potential for inappropriate clustering of clinical behaviors within an overly broad classification of problematic online behavior.

### Future Trends in Online Gaming and Online Gaming Addiction

The amount and the quality of research in the online gaming addiction field have progressed considerably over the last decade but the process is still in its infancy compared with other more established behavioral addictions, such as pathological gambling. This section suggests what might happen in the online gaming addiction field from a number of different standpoints (e.g., methodological, conceptual, technological). These are loosely modeled on the technological trends in gambling outlined by Griffiths (2011).

There is likely to be an even bigger increase in empirical research into problematic gaming and gaming addiction especially now that internet use disorder (which mainly consists of internet gaming addiction) has been included in the appendix of the new *DSM-5* (American Psychiatric Association, 2013). This will also be dependent on appropriate funding streams. Future research is likely to include more epidemiological and/or general population data on media use, leading to better insights into the onset and course of problematic gaming and addiction.

Given the many different screening instruments that have been developed since 2000, there is likely to be a refinement of video game addiction measures and greater consensus on its conceptualization, either as a single disorder and/or incorporated into other known disorders (e.g., impulse control disorder). This is also likely to lead to improved assessment tools based on such conceptualization(s) (King et al., 2013).

Measures of gaming use and subsequent behavior are likely to diversify in terms of media use, including social networking sites (SNS) and associated internet resources (Kuss & Griffiths, 2011). Already, games such as *Call of Duty* and *Battlefield 3* are being released with their own SNS (e.g., COD Elite), which track player behavior and provide feedback to players as to how to improve their game (thus functionally reinforcing video gameplay with implications for excessive and/or potentially addictive play).

With the pressure on media enterprises to monetize their business and look for different revenue streams, there is likely to be even greater media convergence between gaming and other more profit-making activities such as gambling (King et al., 2010b). Given the well-established addictive potential of gambling, this may also have implications for the incidence of gaming addiction.

There is likely to be increasing feminization of gaming where growing numbers of females not only engage in the playing of online games, but also develop problems as a result. Casual gaming online is already popular among females. However, the biggest difference between male and female gaming is likely to be content based (e.g., males may prefer competitive type gaming experiences whereas females may prefer cooperative type gaming experiences).

Given the increasing number of research teams in the gambling field being given direct access to gambling companies' behavioral tracking data (Griffiths & Whitty, 2010), there is likely to be a higher number of such collaborations in the gaming studies field.

The increased importance of additional research into the structural and situational characteristics of consumptive behaviors (e.g., smoking nicotine, drinking alcohol, gambling, etc.) suggests that research on design features within games and their psychological impact

(including potential addiction) will increase as well. Such research has already begun (King et al., 2010a).

As the diagnosis of gaming addiction becomes more legitimate in psychiatric and medical circles, this will lead to better randomized control trials on interventions for problematic video gameplay than those already carried out. There is also likely to be an increase in the online medium itself being used as a treatment channel. The reasons that people like to engage in some online leisure activities (i.e., the fact that the online environment is non-face-to-face, convenient, accessible, affordable, anonymous, nonthreatening, nonalienating, nonstigmatizing, etc.) may also be the same reasons that people would want to seek advice, help, and treatment online rather than in face-to-face situations.

## Conclusion

Based on published empirical studies, and particularly those published since the early 2000s, it appears that in extreme cases excessive online gaming can have potentially damaging effects on individuals who appear to display compulsive and/or addictive behaviors similar to other more traditional addictions. However, the field has been hindered by the use of inconsistent and nonstandardized criteria to assess and identify problematic and/or addictive gaming. Furthermore, most recruitment methods have serious sampling biases with an overreliance on self-selected samples. Despite these shortcomings, there are several noticeable trends:

- There has been a marked shift in how data are collected. Up until the early 2000s, data about gaming behavior were typically collected face to face, whereas contemporary studies collect data online, strategically targeting online forums where gamers are known to (virtually) congregate. These samples are typically self-selecting and (by default) unrepresentative of the general population. Therefore, generalization is almost always one of the methodological shortcomings of this data collection approach.
- Survey study sample sizes have generally increased. In the 1980s and 1990s, sample

sizes were typically in the low hundreds. In the 2000s sample sizes in their thousands – even if unrepresentative – are not uncommon.

- There has been a diversification in the way data are collected, including experiments, physiological investigations, secondary analysis of existing data (such as that collected from online forums), and behavioral tracking studies.
- There has been an increase in research on adult (i.e., nonchild and nonadolescent) samples reflecting the fact that the demographics of gaming have changed.
- There has been increasing sophistication in relation to issues concerning the assessment and measurement of problematic video gameplay and video game addiction. In the last few years, instruments have been developed that have more robust psychometric properties in terms of reliability and validity. However, there are still some concerns, as many of the most widely used screening instruments were adapted from adult screens and much of the video game literature has examined children and adolescents. King and colleagues (2012) assert that, to enable advances in the development and testing of interventions for gaming related problems, there must be some consensus among clinicians and researchers as to the precise classification of these problems.

Clearly, there exist a number of gaps in current understanding of problematic gaming and gaming addiction. There is a need for epidemiological research to determine the incidence and prevalence of clinically significant problems associated with gaming in the broader population. There are too few clinical studies that describe the unique features and symptoms of problematic gaming and/or gaming addiction. Most of the studies tend to examine problematic gaming from the perspective of the individual. However, there is a small body of research suggesting that the characteristics of online games themselves may have a role in the acquisition, development, and maintenance of video game addiction. These studies have investigated the role of structural characteristics of video games in maintaining problem playing behavior, but there is little empirical research that examines why some individuals may be protected from developing

excessive playing habits, or simply mature out of their problem playing behavior.

Another growing concern is the recent explosion of online and mobile gaming, although as yet little research has been done. There are also strong links between online gaming, gambling, nongambling fantasy games, role playing games, board games, and card games. These may be an additional cause for concern as youth migrate from free gaming sites to online gambling sites, as these have greater financial consequences and may lead not just to loss of time but to loss of money. It should also be noted that gaming does not occur in a vacuum but is just one behavior engaged in alongside many others. Very few studies have been used to examine links between video games and other risk behaviors (e.g., gambling, drug and alcohol use, seatbelt use, poor school performance, conduct problems, truancy, delinquency, violence, and sexual activity). While the empirical base is relatively small, online gaming addiction has become a mainstream area for psychological and psychiatric research and is likely to become an area of significant importance given the widespread popularity of gaming.

SEE ALSO: Massively Multiplayer Online Role Playing Games (MMORPGs); Online Games; Online Games, Effects of; Online Games, Player Experiences in; Online Games and Role Playing

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