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Chaos and confusion in DSM-5 diagnosis of Internet Gaming Disorder: Issues, concerns, and recommendations for clarity in the field

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Background: The umbrella term "Internet addiction" has been criticized for its lack of specificity given the heterogeneity of potentially problematic behaviors that can be engaged in online as well as different underlying etiological mechanisms. This has led to the naming of specific online addictions, the most notable being Internet Gaming Disorder (IGD). *Methods:* Using the contemporary literature concerning IGD and cognate topics, issues and concerns relating to the concept of IGD are examined. *Results:* Internet addiction and IGD are not the same, and distinguishing between the two is conceptually meaningful. Similarly, the diagnosis of IGD as proposed in the appendix of the latest (fifth) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) remains vague regarding whether or not games need to be engaged in online, stating that IGD typically involves specific Internet games, but can also include offline games, adding to the lack of clarity. A number of authors have voiced concerns regarding the viability of including the word "Internet" in IGD, and instead proposed to use the term "video gaming disorder" or simply "gaming disorder," suggesting addiction to video gaming can also occur offline. *Conclusion:* The DSM-5 has caused more confusion than clarity regarding the disorder, reflected by researchers in the field contesting a supposedly reached consensus for IGD diagnosis.

Keywords: Internet Gaming Disorder, gaming addiction, video game addiction, Internet addiction, Internet addiction disorder, DSM-5 diagnosis

INTRODUCTION

Video gaming is a fast-growing leisure activity, and has seen significant increases in revenue within the entertainment industry. Sales of video games in the US created $15.4 billion in revenue in 2014, and the total consumer spend on the games industry in the same year (including content, accessories, and hardware) amounted to $22.4 billion (Entertainment Software Association, 2015). Moreover, the Entertainment Retailers Association indicated that video games were more popular than videos and music with regards to sales in 2014 (UKIE, 2015), again highlighting the mass appeal of gaming.

According to the Nielsen 360° Gaming Report (The Nielsen Company, 2014), gamers spend 12% more time on gaming now than they did in 2012. On average, they spend more than 6 hr on gaming during an average week. Furthermore, contemporary video gaming (that will simply be called "gaming" for the rest of this paper) can be engaged in using a variety of platforms, including personal computers, dedicated game consoles as well as portable devices, including tablets, laptops, and smartphones, with multiplatform gaming use comprising about 50% of US console gamers. This indicates that gaming does not necessarily have to be a computer- or console-bound activity. The average age of a gamer is now 34 years, and 40% of all gamers are female (Entertainment Software Rating Board, 2016), indicating that the commonly held stereotype of the adolescent gamer needs a complete overhaul (Griffiths, Davies, & Chappell, 2003), and indicating that there is an increasingly broad market for gaming.

Massively Multiplayer Online Role-Playing Games (MMORPGs) are arguably the most popular type of online games, played by 46% of online gamers (Nagygyörgy et al., 2013), although Multiplayer Online Battle Arena (MOBA) games like League of Legends have also become incredibly popular (Nuyens et al., 2016). MMORPGs are large gaming universes that accommodate thousands of players at the same time (hence, the term "massively multiplayer") with no spatial or temporal limitations as they are played online, and encourage players to adopt different personas by means of their avatars (role playing) (Kuss, Louws, & Wiers, 2012). Internet technology has thus provided a medium for millions of gamers worldwide to play in large game universes simultaneously, allowing social interactions and virtual community building (often in the form of guilds and clans). These kinds of games provide various incentives to players, and can be tailored to the individual player's needs. In early research on MMORPG playing, Yee (2006) asked 3,000 MMOPRG players about their gaming

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motivations, and his analysis indicated that gamers played to (a) achieve goals, (b) be social, and (c) immerse themselves in the game. Two-fifths of the most frequent gamers play social games (39%), which is higher than action games and puzzle/board/card games (Entertainment Software Association, 2015). This suggests that social interaction is an important motivator for gamers to initiate and maintain game play. MMORPGs appear very versatile and this may contribute to the mass appeal of gaming (Kuss, 2013). In addition to this, MMOPRGs have been shown to have a higher addictive potential than other games (Kuss & Griffiths, 2012a; Kuss et al., 2012), which can partly be explained by their fulfillment of particular gaming motivations.

Among MMORPG players, the motivations of achievement, socializing, and escapism are factors that are predictive of gaming addiction, and together with male gender explained 19% of gaming addiction scores in one study (i.e., Zanetta Dauriat et al., 2011). Escapism and game mechanics (i.e., optimizing game play via in-game affordances) were more important predictors of gaming addiction than gender and time spent gaming, explaining 46% of the variance in gaming addiction in another study (i.e., Kuss et al., 2012). In addition to offering game content and gaming possibilities for a wide variety of players, MMORPGs are designed in such a way that they reward players using partial reinforcement schedules, leading to the maintenance of game play (Ng & Wiemer-Hastings, 2005).

For a minority of gamers, these online worlds may be a substitute for the lack of real-life social contexts and may draw such individuals to these games. Research suggests that specific types of online games have a relatively high addictive potential for some players. For instance, it has been noted that MMORPGs can become addictive to a minority of gamers (Kuss & Griffiths, 2012a) as they require significant investments in terms of time and energy, and offer players the possibility to escape their real-life problems (Kuss et al., 2012). Twenty years of research on technology-use related problems have indicated that technology overuse may result in problems that are traditionally associated with substance-related addictions, including addiction symptoms, such as salience, mood modification, withdrawal, tolerance, conflict, and relapse (Kuss, Shorter, van Rooij, Griffiths, & Schoenmakers, 2014).

In 2013, the American Psychiatric Association published the most recent (i.e., fifth) edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5), which for the first time incorporated diagnostic criteria for Internet Gaming Disorder (IGD) in its appendix (Section 3) in which conditions were included that required additional research in order to feature in future versions of the manual. IGD appeared as the second behavioral addiction included in the manual following the inclusion of gambling disorder, which – for the first time – was considered a behavioral addiction in diagnostic history (rather than being categorized as an impulse-control disorder as it had been in previous editions since 1980) (American Psychiatric Association, 2013).

Since this new provisional diagnosis, researchers have questioned the validity of the IGD construct as a diagnostic entity. More specifically, the viability of including the word "Internet" in IGD has been challenged, and instead researchers have proposed to use the term "video gaming disorder" (or simply "gaming disorder") suggesting excessive video gaming does not necessarily have to occur online (e.g., Griffiths & Pontes, 2014; King & Delfabbro, 2013). Given these debates, this paper discusses the viability of including the term "Internet" in IGD. The purpose is to outline the advantages and disadvantages of focusing on online gaming rather than gaming addiction in its entirety in order to carry the research field forward.

IGD DIAGNOSIS: ISSUES AND CONCERNS

Diagnostic criteria

The umbrella term "Internet addiction" has been criticized for its lack of specificity given the heterogeneity of potentially problematic behaviors that can be engaged in online as well as different underlying etiological mechanisms (Kuss & Billieux, in press; Starcevic & Aboujaoude, 2016). In a response to Petry et al.'s (2014) paper that outlined a supposed "*consensus*" in the field of IGD, Griffiths et al. (2016) outlined their reasons for why an international consensus regarding IGD diagnosis does not exist, pointing to the limitations of the current preliminary diagnosis. Their main argument was the fact that Petry et al.'s paper did not represent the international research community adequately (as evidenced by only including 12 researchers in the initial "consensus" paper – a number of whom had published little in the gaming studies field – and the omission of many leading and most cited scholars in the field including the present authors). Their additional arguments with regards to the respective criteria will be summarized subsequently.

The preoccupation criterion (i.e., "Do you spend a lot of time thinking about games even when you are not playing, or planning when you can play next?") has been criticized for pathologizing everyday gaming experiences of children, adolescents, and adults (Kardefelt-Winther, 2014c, 2015a). It is contended that enthusiasts of any particularly engaging pastime activity, including – but not limited to – gaming, spend considerable amounts of time thinking about and discussing their respective pastime activities (Griffiths et al., 2016). Moreover, in the context of gaming, it has been shown that spending considerable amounts of time discussing gaming strategies is common and important for gamers, especially for those who play professionally (Faust, Meyer, & Griffiths, 2013) and who are considered high achievers in the game (Ko et al., 2014).

For many years, there has been an ongoing debate about differentiating between high engagement and addiction to gaming (Charlton, 2002; Charlton & Danforth, 2007, 2010; Griffiths, 2010), and it is sometimes difficult to draw a clear line between the two based on the existent diagnostic criteria. Moreover, King and Delfabbro (2014) have drawn attention to the intricacy of preoccupation as a diagnostic criterion for IGD, stating that both time spent gaming as well as cognitive content should be included in this criterion. The current wording of the preoccupation criterion does not leave space for cognitive adaptations with regards to

gaming-related thoughts as it is contended that a gamer who spends all his time gaming will not have any time left to think about the game (Griffiths et al., 2016).

The withdrawal criterion (i.e., "Do you feel restless, irritable, moody, angry, anxious, or sad when attempting to cut down or stop gaming, or when you are unable to play?") has also come under much criticism. The main argument against including withdrawal as criterion for IGD is the fact that unlike with traditional substance-related addictions, no substance is consumed which directly impacts on the neurophysiological system of the individual (Van Rooij & Prause, 2014), although most neurobiological research into non-chemical (i.e., behavioral) addictions has shown that such activities cause neurophysiological changes in the body (Kuss & Griffiths, 2012b; Lin, Jia, Zang, & Dong, 2015; Tian et al., 2014). It has been argued that actual physiological and measureable withdrawal symptoms should not be confused with negative emotions as a consequence of sudden discontinuation of game play, and instead, symptoms lasting a few hours to a few days following discontinuation of play can be considered as withdrawal symptoms (Griffiths et al., 2016).

Symptoms that are experienced for extended time periods can then be referred to as cravings (Ko, Yen, Chen, Chen, & Yen, 2005), suggesting that the criterion should include a specific timeframe. A recent systematic review conducted by Kaptsis, King, Delfabbro, and Gradisar (2016) investigated the state of current knowledge of gaming withdrawal symptomatology by reviewing a total of 34 studies, including 10 qualitative studies, 17 research reports on psychometric instruments, and 7 treatment studies. The review found that the existing evidence on withdrawal symptoms is very underdeveloped as there is a lack of qualitative studies providing detailed clinical descriptions of symptoms arising from cessation of gaming, which in turn has led to compromised efforts to quantify withdrawal symptoms in most empirical studies. This led the authors to conclude that gaming-related problems may arise without associated withdrawal symptoms. Notwithstanding this, it needs to be stated that previous research has indicated that withdrawal can be viewed as one of the core criteria of IGD given its diagnostic accuracy (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013; Ko et al., 2014), highlighting the disagreement about the inclusion of this criterion in the scientific (and more specifically gaming studies) community.

The tolerance criterion (i.e., "Do you feel that you should play less, but are unable to cut back on the amount of time you spend on playing games?") has also come under criticism. A number of authors suggest it is a very strong criterion because of its high diagnostic accuracy (Ko et al., 2014), and some researchers suggest that the wording of the criterion needs to be changed to adequately reflect the individual's desire to stop gaming (Griffiths et al., 2016). Moreover, it has been suggested that despite the potential negative consequences of the gaming behaviors, some individuals may engage in it out of their own free will or may think it is egosyntonic (Kardefelt-Winther, 2015b; Van Rooij & Prause, 2014) and that there appears a societal requirement to engage in gaming which is often ignored by parents (Kardefelt-Winther, 2015a, 2015b).

With regards to the criterion of giving up other activities (i.e., "Do you lose interest in or reduce participation in other recreational activities (hobbies, meetings with friends, etc.) due to gaming?"), researchers in the field have contended that on the one hand, giving up alternative activities is a part of a developmental process. On the other hand, it may be a symptom of depression (Griffiths et al., 2016), which is often comorbid with addictive use of the Internet and gaming (Kuss & Lopez-Fernandez, 2016). In general, giving up alternative activities for the sake of gaming cannot be considered problematic in and of itself (in contrast to substance use that has a direct negative impact on biochemistry) (Griffiths, 2010; Hellman, Schoenmakers, Nordstrom, & van Holst, 2013; Kardefelt-Winther, 2015a) unless it leads to detrimental consequences in the individual's life, and it has been contended that it is part of a normal developmental process to exchange activities previously engaged in for new activities, including gaming.

The continuing of gaming despite problems criterion (i.e., "Do you continue to play games even though you are aware of negative consequences, such as not getting enough sleep, being late to school/work, spending too much money, having arguments with others, or neglecting important duties?") appears to be viewed as valid and accurate by most researchers in the field. Nonetheless, the extent to which affected individuals recognize the ensuing problems as consequences of their excessive gaming may depend on whether the consequences are viewed as occurring over the short term or long term (Griffiths et al., 2016).

The deception/covering up criterion (i.e., "Do you lie to family, friends, or others about how much you game, or try to keep your family or friends from knowing how much you game?") has been contested widely among the scientific community. The IGD criteria in the DSM-5 derive from a study conducted in China (Tao et al., 2010), and the original authors decided to exclude this criterion based on its low endorsement among clinical populations, and this has been confirmed by other research studies (King et al., 2013; Ko et al., 2014) that excluded this criterion. Gamers (who typically play at home) need to live with other people for this criterion to be applicable, which of course is not always the case (Griffiths et al., 2016). In addition to this, if gaming is viewed as a pointless pastime activity by parents, children are more inclined to hide and not to tell the truth about their gaming behaviors, suggesting this criterion is an indicator of how parents view the gaming, and not a valid IGD criterion (Kardefelt-Winther, 2015a).

With regards to escaping adverse moods (i.e., "Do you game to escape from or forget about personal problems, or to relieve uncomfortable feelings, such as guilt, anxiety, helplessness, or depression?"), much of the relevant literature (Billieux et al., 2011; Kuss et al., 2012; Van Rooij, Schoenmakers, & van de Mheen, 2014) indicates that this criterion is valid for IGD diagnosis. Nonetheless, other research suggests that this criterion has limited specificity with regards to distinguishing addicted gamers from those that are not addicted (Ko et al., 2014; Lemmens, Valkenburg, & Gentile, 2015; Pontes, Király, Demetrovics, & Griffiths, 2014) and that many gamers view using their activity to escape and lose time as a positive feature of

gaming rather than a negative one (Wood & Griffiths, 2007; Wood, Griffiths, & Parke, 2007).

In addition to this, it has been suggested that this criterion may be indicative of a primary problem of depression, anxiety, or other mental disorder, decreasing its significance for an IGD diagnosis. However, this criterion appears useful as it is an indication that there is something happening in the individual's life that leads them to engage in (excessive) gaming, which might be used as a maladaptive coping strategy and consequently result in giving up other important activities in life (Kardefelt-Winther, 2014a, 2014b; King & Delfabbro, 2014), offering an explanation for maintaining gaming (Griffiths et al., 2016).

The final criterion involving risking or losing relationships and opportunities ("Do you risk or lose significant relationships, or job, educational or career opportunities because of gaming?"), appears to lack sufficient clinical evidence (Van Rooij, Schoenmakers, et al., 2014) to be included as IGD criterion, and diagnostic specificity to distinguish between gaming addiction and high engagement (Duven, Müller, Beutel, & Wölfling, 2015). In addition to this, it has been stated that it would be worthwhile including the loss of potential opportunities (rather than the loss of something). Moreover, the wording has been criticized as it has been recommended to simplify and specify it by including "because of the amount of time spent gaming and your preoccupation with gaming" as the original "because of gaming" does not appear to be precise enough. Once the problems regarding the actual wording have been overcome, including this criterion for IGD diagnosis may appear useful (Griffiths et al., 2016).

It has furthermore been noted that a severity dimension of the proposed DSM-5 IGD diagnosis has not been included, and neither have primary and secondary criteria been differentiated, which is particularly relevant as recent empirical studies have shown that the nine IGD criteria appear to have different relevance regarding the final diagnosis (Rehbein, Kliem, Baier, Mößle, & Petry, 2015) and may be more or less relevant depending on the stage of the disorder (Király et al., 2015). In addition to this, the classification does not draw a distinction between short-term and long-term excessive gaming, which is problematic particularly in light of children's and adolescents' gaming use (King & Delfabbro, 2013). They find themselves in critical developmental stages in which high engagement and possibly excessive gaming may be nothing more but a "phase" (Stavropoulos, Kuss, Griffiths, & Motti-Stefanidi, in press).

Problematic Internet and gaming use furthermore appears highly comorbid with various other mental and physical disorders, including depression, anxiety disorders, obesity, and attention-deficit hyperactivity disorder (Henchoz et al., 2016; Pontes & Griffiths, 2016; Turel, Romashkin, & Morrison, 2016; Yen et al., 2016), and psychological and psychopharmacological treatments used for these disorders appear similarly efficacious in treating Internet addiction and gaming addiction (Kuss & Lopez-Fernandez, 2016), putting into question the ability to differentiate mental disorder diagnoses (King & Delfabbro, 2013). This exacerbates everyday diagnostic practice in both clinical as well as research contexts.

THE "INTERNET" IN INTERNET GAMING DISORDER

A number of researchers have contested the previously adopted term of "Internet addiction" as being inadequate as (a) individuals rarely become addicted to the medium of the Internet itself and (b) the term "Internet addiction" does not differentiate adequately between the different types of online behaviors, some of which can be more addictive than others (e.g., Starcevic, 2013; Starcevic & Aboujaoude, 2016). For instance, Kuss and colleagues have shown that online gaming and online social networking appear as particularly strong risk factors for addiction (Kuss, Griffiths, & Binder, 2013; Kuss, van Rooij, Shorter, Griffiths, & van de Mheen, 2013). Rather than being addictive *per se*, the Internet may facilitate the engagement in certain behaviors due to its Triple-A engine consisting of affordability, anonymity, and accessibility (Cooper, Putnam, Planchon, & Boies, 1999).

It has furthermore been argued theoretically (Griffiths & Pontes, 2014) and demonstrated empirically (Király et al., 2014) that problematic Internet use and problematic online gaming are not the same. In the case of gaming, scholars have long argued that the diagnosis of IGD is inaccurate as it does not pay adequate attention to possibly addictive gaming patterns that occur without Internet connection (e.g., Griffiths, King, & Demetrovics, 2014; Griffiths & Pontes, 2014; King & Delfabbro, 2013). The APA itself is very vague in their description of IGD subtypes, stating that "Internet Gaming Disorder most often involves specific Internet games, but it could involve non-Internet computerized games as well, although these have been less researched. It is likely that preferred games will vary over time as new games are developed and popularized, and it is unclear if behaviors and consequences associated with Internet Gaming Disorder vary by gaming type" (American Psychiatric Association, 2013, p. 796).

The possibility of including non-Internet games in a classification of IGD is odd, if not highly questionable (Griffiths & Pontes, 2014). One can argue that games do not have to be played online to be potentially addictive. In fact, early research on the topic has specifically looked into offline games (Soper & Miller, 1983), and various studies have specifically referred to *video* gaming (including offline gaming) rather than *online* gaming (e.g., King & Delfabbro, 2012; Van Rooij, Kuss, et al., 2014; Wölfling & Müller, 2010; Wölfling, Thalemann, & Grüsser, 2008). A recent empirical study by Lemmens and Hendriks (2016) sought to investigate whether IGD was more likely to involve online (i.e., Internet) as opposed to offline games by examining the relationship between IGD, game patterns, and 2,720 game genres played in a heterogeneous and representative sample of 2,442 adults and adolescents in the Netherlands. The authors found that disordered gamers spent more than four times as much time playing online role-playing games than non-disordered gamers and more than three times as much time playing online shooter games. However, no significant differences for offline games from these genres were found, underscoring the addictive potential for offline games, even though online games clearly appear to exhibit a greater addictive potential.

CONCLUSION

Clinical diagnoses have a number of advantages. Diagnoses and agreed upon criteria allow for the development of effective and efficacious treatment plans that benefit the individuals who require professional help. Once we know what it is that needs to be treated, the best strategies to treat it can be developed and applied. In addition to this, an official diagnosis (including agreed upon and prioritized critical criteria, levels of severity, and cutoff points) support research endeavors in the area of IGD (or whatever the revised nosological classification will end up being) as researchers can communicate their findings, collaborate, and compare their results in cross-cultural research. Having established and agreed upon diagnostic criteria allows for communication of professionals about the respective condition in a standard and comparable way. Moreover, having a diagnosis will likely provide an incentive for treatment and insurance providers to fund evidence-based treatments.

Without a diagnosis, there will be no grounds upon which a client's claim for support will be based and therefore having a diagnosis may be the crucial first step to qualify for treatment (Kuss & Griffiths, 2015). At the individual level, a potential IGD diagnosis could also lead to the destigmatization of patients as they may find validation for their gaming-related problems. Finally, it is recommended that the APA considers the outlined issues and concerns when developing an updated version of the DSM, taking into account the nosological and criteria-related problems that have been outlined in this paper.

Griffiths et al. (2016) have also made a number of recommendations about how consensus concerning IGD in studying gaming behaviors can be achieved. These included: (a) carrying out further studies from treatment-seeking individuals in the clinical population (i.e., live field testing) rather than further epidemiological studies in countries that have already carried out such studies (because epidemiological studies are not the best place to identify and examine new disorders); (b) carrying out studies on heavy use of gaming among those without any problems (i.e., high engagement players); (c) forming an international alliance of IGD researchers to generate an item pool of IGD items for use in multinational collaborative studies; (d) forming working parties that comprise multi-stakeholders rather than just academics (e.g., gaming industry, gamers, psychiatrists, therapists, etc.); and (e) re-evaluating already existing data on IGD more effectively and critically to help develop consensus (as this might be helpful for understanding the nature of some aspects, such as withdrawal).

Despite the contingencies offered by the Internet (i.e., offering the possibility to connect many individuals at the same time in online games, such as MMOPRGs, its time and space compression; Kuss et al., 2012), an online network does not constitute a prerequisite of potentially addictive gaming behaviors. Overall, the existing literature on gaming addiction suggests that playing an online game may increase the chances of potential addiction compared to an offline game (Kuss & Griffiths, 2012a; Lemmens & Hendriks, 2016). However, it does not preclude playing offline games from being possibly addictive, which is also reflected in the current yet preliminary IGD diagnosis.

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REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5)*. Arlington, VA: American Psychiatric Association.

Billieux, J., Chanal, J., Khazaal, Y., Rochat, L., Gay, P., Zullino, D., & Van der Linden, M. (2011). Psychological predictors of problematic involvement in massively multiplayer online role-playing games: Illustration in a sample of male cybercafe players. *Psychopathology, 44*(3), 165–171. doi:10.1159/000322525

Charlton, J. P. (2002). A factor-analytic investigation of computer 'addiction' and engagement. *British Journal of Psychology, 93,* 329–344. doi:10.1348/000712602760146242

Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior, 23*(3), 1531–1548. doi:10.1016/j.chb.2005.07.002

Charlton, J. P., & Danforth, I. D. W. (2010). Validating the distinction between computer addiction and engagement: Online game playing and personality. *Behaviour & Information Technology, 29*(6), 601–613. doi:10.1080/01449290903401978

Cooper, A., Putnam, D. E., Planchon, L. A., & Boies, S. C. (1999). Online sexual compulsivity: Getting tangled in the net. *Sexual Addiction & Compulsivity, 6,* 79–104. doi:10.1080/10720169908400182

Duven, E. C., Müller, K. W., Beutel, M. E., & Wölfling, K. (2015). Altered reward processing in pathological computer gamers – ERP-results from a semi-natural gaming-design. *Brain & Behavior, 5*(1), 13–23. doi:10.1002/brb3.293

Entertainment Software Association. (2015). *Essential facts about the computer and video game industry. 2015 sales, demographic and usage data*. Washington, D.C: Entertainment Software Association.

Entertainment Software Rating Board. (2016). *Video game industry statistics*. Retrieved from http://www.esrb.org/about/video-game-industry-statistics.aspx

Faust, K., Meyer, J. & Griffiths, M. D. (2013). Competitive gaming: The potential benefits of scientific study. *International Journal of Cyber Behavior, Psychology and Learning, 3*(1), 67–76. doi:10.4018/ijcbpl.2013010106

Griffiths, M. D. (2010). The role of context in online gaming excess and addiction: Some case study evidence. *International Journal of Mental Health and Addiction, 8*(1), 119–125. doi:10.1007/s11469-009-9229-x

Griffiths, M. D., Davies, M. N. O., & Chappell, D. (2003). Breaking the stereotype: The case of online gaming. *Cyber-*

Psychology & Behavior, 6(1), 81–91. doi:10.1089/109493103321167992

Griffiths, M. D., King, D. L., & Demetrovics, Z. (2014). DSM-5 Internet Gaming Disorder needs a unified approach to assessment. *Neuropsychiatry, 4*(1), 1–4. doi:10.2217/npy.13.82

Griffiths, M. D., & Pontes, H. M. (2014). Internet Addiction Disorder and Internet Gaming Disorder are not the same. *Journal of Addiction Research and Therapy, 5,* e124. doi:10.4172/2155-6105.1000e124

Griffiths, M. D., van Rooij, A., Kardefelt-Winther, D., Starcevic, V., Király, O., Pallesen, S., Müller, K., Dreier, M., Carras, M., Prause, N., & King, D. L. (2016). Working towards an international consensus on criteria for assessing Internet Gaming Disorder: A critical commentary on Petry et al. (2014). *Addiction, 111*(1), 167–175. doi:10.1111/add.13057

Hellman, M., Schoenmakers, T. M., Nordstrom, B. R., & van Holst, R. J. (2013). Is there such a thing as online video game addiction? A cross-disciplinary review. *Addiction Research & Theory, 21*(2), 102–112. doi:10.3109/16066359.2012.693222

Henchoz, Y., Studer, J., Deline, S., N'Goran, A. A., Baggio, S., & Gmel, G. (2016). Video gaming disorder and sport and exercise in emerging adulthood: A longitudinal study. *Behavioral Medicine, 42*(2), 105–111. doi:10.1080/08964289.2014.965127

Kaptsis, D., King, D. L., Delfabbro, P. H., & Gradisar, M. (2016). Withdrawal symptoms in internet gaming disorder: A systematic review. *Clinical Psychology Review, 43,* 58–66. doi:10.1016/j.cpr.2015.11.006

Kardefelt-Winther, D. (2014a). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior, 31,* 351–354. doi:10.1016/j.chb.2013.10.059

Kardefelt-Winther, D. (2014b). The moderating role of psychosocial well-being on the relationship between escapism and excessive online gaming. *Computers in Human Behavior, 38,* 68–74. doi:10.1016/j.chb.2014.05.020

Kardefelt-Winther, D. (2014c). *Meeting the unique challenges of assessing Internet Gaming Disorder*. Addiction, *109,* 1568–1570. doi:10.1111/add.12645

Kardefelt-Winther, D. (2015a). A critical account of DSM-5 criteria for Internet Gaming Disorder. *Addiction Research & Theory, 23*(2), 93–98. doi:10.3109/16066359.2014.935350

Kardefelt-Winther, D. (2015b). *Excessive Internet use – Fascination or compulsion?* (PhD thesis). The London School of Economics and Political Science, London, UK.

King, D. L., & Delfabbro, P. H. (2012). Issues for DSM-5: Video-gaming disorder? *Australian and New Zealand Journal of Psychiatry, 47*(1), 20–22. doi:10.1177/0004867412464065

King, D. L., & Delfabbro, P. H. (2013). Video-gaming disorder and the DSM-5: Some further thoughts. *Australian and New Zealand Journal of Psychiatry, 47*(9), 875–876. doi:10.1177/0004867413495925

King, D. L., & Delfabbro, P. H. (2014). The cognitive psychology of Internet gaming disorder. *Clinical Psychology Review, 34,* 298–308. doi:10.1016/j.cpr.2014.03.006

King, D. L., Haagsma, M. C., Delfabbro, P. H., Gradisar, M., & Griffiths, M. D. (2013). Toward a consensus definition of pathological video-gaming: A systematic review of psychometric assessment tools. *Clinical Psychology Review, 33*(3), 331–342. doi:10.1016/j.cpr.2013.01.002

Király, O., Griffiths, M. D., Urbán, R., Farkas, J., K k nyei, G., Elekes, Z., Tamás, D., & Demetrovics, Z. (2014). Problematic Internet use and problematic online gaming are not the same: Findings from a large nationally representative adolescent sample. *Cyberpsychology, Behavior & Social Networking, 17*(2), 1–6. doi:10.1089/cyber.2014.0475

Király, O., Sleczka, P., Pontes, H. M., Urbán, R., Griffiths, M. D., & Demetrovics, Z. (2015). Validation of the Ten-Item Internet Gaming Disorder Test (IGDT-10) and evaluation of the nine DSM-5 Internet Gaming Disorder criteria. *Addictive Behaviors*. doi:10.1016/j.addbeh.2015.11.005

Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H., & Yen, C. F. (2005). Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *Journal of Nervous and Mental Disease, 193*(4), 273–277. doi:10.1097/01.nmd.0000158373.85150.57

Ko, C.-H., Yen, J.-Y., Chen, S.-H., Wang, P.-W., Chen, C.-S., & Yen, C.-F. (2014). Evaluation of the diagnostic criteria of Internet gaming disorder in the DSM-5 among young adults in Taiwan. *Journal of Psychiatric Research, 53,* 103–110. doi:10.1016/j.jpsychires.2014.02.008

Kuss, D. J. (2013). Internet gaming addiction: Current perspectives. *Psychology Research and Behavior Management, 6,* 125–137. doi:10.2147/PRBM.S39476

Kuss, D. J., & Billieux, J. (in press). Technological addictions: Conceptualisation, measurement, etiology and treatment. *Addictive Behaviors*. doi:10.1016/j.addbeh.2016.04.005

Kuss, D. J., & Griffiths, M. D. (2012a). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction, 10*(2), 278–296. doi:10.1007/s11469-011-9318-5

Kuss, D. J., & Griffiths, M. D. (2012b). Internet and gaming addiction: A systematic literature review of neuroimaging studies. *Brain Sciences, 2*(3), 347–374. doi:10.3390/brainsci2030347

Kuss, D. J., & Griffiths, M. D. (2015). *Internet addiction in psychotherapy*. Basingstoke: Palgrave Macmillan.

Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior, 29*(3), 959–966. doi:10.1016/j.chb.2012.12.024

Kuss, D. J., & Lopez-Fernandez, O. (2016). Internet addiction and problematic Internet use: A systematic review of clinical research. *World Journal of Psychiatry, 6*(1), 143–176. doi:10.5498/wjp.v6.i1.143

Kuss, D. J., Louws, J., & Wiers, R. W. W. (2012). Online gaming addiction? Motives predict addictive play behavior in massively multiplayer online role-playing games. *Cyberpsychology, Behavior & Social Networking, 15*(9), 480–485. doi:10.1089/cyber.2012.0034

Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. (2014). Assessing Internet addiction using the parsimonious Internet addiction components model – A preliminary study. *International Journal of Mental Health and Addiction, 12*(3), 351–366. doi:10.1007/s11469-013-9459-9

Kuss, D. J., van Rooij, A., Shorter, G. W., Griffiths, M. D., & van de Mheen, D. (2013). Internet addiction in adolescents: Prevalence and risk factors. *Computers in Human Behavior, 29*(5), 1987–1996. doi:10.1016/j.chb.2013.04.002

Lemmens, J. S., & Hendriks, S. J. F. (2016). Addictive online games: Examining the relationship between game genres and Internet Gaming Disorder. *Cyberpsychology, Behavior and*

Social Networking, 19(4), 270–276. doi:10.1089/cyber.2015.0415

Lemmens, J. S., Valkenburg, P. M., & Gentile, D. A. (2015). The Internet Gaming Disorder scale. *Psychological Assessment, 27*(2), 567–582. doi:10.1037/pas0000062

Lin, X., Jia, X., Zang, Y. F., & Dong, G. (2015). Frequency-dependent changes in the amplitude of low-frequency fluctuations in Internet Gaming Disorder. *Frontiers in Psychology, 6*(1471). doi:10.3389/fpsyg.2015.01471

Nagygyörgy, K., Urbán, R., Farkas, J., Griffiths, M. D., Zilahy, D., Kökönyei, G., Mervó, B., Reindl, A., Ágoston, C., Kertész, A., & Harmath, E. (2013). Typology and sociodemographic characteristics of massively multiplayer online game players. *International Journal of Human-Computer Interaction, 29,* 192–200. doi:10.1080/10447318.2012.702636

Ng, B. D., & Wiemer-Hastings, P. (2005). Addiction to the Internet and online gaming. *CyberPsychology & Behavior, 8*(2), 110–113. doi:10.1089/cpb.2005.8.110

Nuyens, F., Deleuze, J., Maurage, P., Griffiths, M. D., Kuss, D. J., & Billieux, J. (2016). Impulsivity in Multiplayer Online Battle Arena (MOBA) gamers: Preliminary results on experimental and self-report measures. *Journal of Behavioral Addictions, 5*(1), 1–6. doi:10.1556/2006.5.2016.028

Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H.-J., Mößle, T., Bischof, G., Tao, R., Fung, D. S., Borges, G., & Auriacombe, M. (2014). An international consensus for assessing internet gaming disorder using the new DSM-5 approach. *Addiction, 109*(9), 1399–1406. doi:10.1111/add.12457

Pontes, H. M., & Griffiths, M. D. (2016). Portuguese validation of the Internet Gaming Disorder Scale-Short-Form. *CyberPsychology Behavior & Social Networking, 19*(4), 288–293. doi:10.1089/cyber.2015.0605

Pontes, H. M., Király, O., Demetrovics, Z., & Griffiths, M. D. (2014). The conceptualisation and measurement of DSM-5 Internet Gaming Disorder: The development of the IGD-20 test. *PLoS One, 9*(10), e110137. doi:10.1371/journal.pone.0110137

Rehbein, F., Kliem, S., Baier, D., Mößle, T., & Petry, N. M. (2015). Prevalence of Internet Gaming Disorder in German adolescents: Diagnostic contribution of the nine DSM-5 criteria in a state-wide representative sample. *Addiction, 110*(5), 842–851. doi:10.1111/add.12849

Soper, W. B., & Miller, M. J. (1983). Junk-time junkies: An emerging addiction among students. *School Counselor, 31*(1), 40–43.

Starcevic, V. (2013). Video-gaming disorder and behavioural addictions. *Australian and New Zealand Journal of Psychiatry, 47*(3), 285–286. doi:10.1177/0004867413476145

Starcevic, V., & Aboujaoude, E. (2016). Internet addiction: Reappraisal of an increasingly inadequate concept. *CNS Spectrums, 1,* 1–7. doi:10.1017/S1092852915000863

Stavropoulos, V., Kuss, D. J., Griffiths, M. D., & Motti-Stefanidi, F. (in press). MMORPG gaming and hostility predict Internet addiction symptoms in adolescents: An empirical multilevel longitudinal study. *Addictive Behaviors*. doi:10.1016/j.addbeh.2015.09.001

Tao, R., Huang, X., Wang, J., Zhang, H., Zhang, Y., & Li, M. (2010). Proposed diagnostic criteria for internet addiction. *Addiction, 105*(3), 556–564. doi:10.1111/j.1360-0443.2009.02828.x

Tian, M., Chen, Q., Zhang, Y., Du, F., Hou, H., Chao, F., & Zhang, H. (2014). PET imaging reveals brain functional changes in Internet Gaming Disorder. *European Journal of Nuclear Medicine and Molecular Imaging, 41,* 1388–1397. doi:10.1007/s00259-014-2708-8

The Nielsen Company. (2014). *Multi-platform gaming: For the win!* Retrieved from http://www.nielsen.com/us/en/insights/news/2014/multi-platform-gaming-for-the-win.html

Turel, O., Romashkin, A., & Morrison, K. M. (2016). Health outcomes of information system use lifestyles among adolescents: Videogame addiction, sleep curtailment and cardiometabolic deficiencies. *PLoS One, 11*(5), e0154764. doi:10.1371/journal.pone.0154764

UKIE. (2015). *The games industry in numbers*. Retrieved from http://ukie.org.uk/research#Market

Van Rooij, A. J., Kuss, D. J., Griffiths, M. D., Shorter, G. W., Schoenmakers, T. M., & Van de Mheen, D. (2014). The (co-) occurrence of problematic video gaming, substance use, and psychosocial problems in adolescents. *Journal of Behavioral Addictions, 3*(3), 157–165. doi:10.1556/JBA.3.2014.013

Van Rooij, A. J., & Prause, N. (2014). A critical review of "Internet addiction" criteria with suggestions for the future. *Journal of Behavioral Addictions, 3*(4), 203–213. doi:10.1556/JBA.3.2014.4.1

Van Rooij, A. J., Schoenmakers, T. M., & van de Mheen, D. (2014). *C-VAT 2.0. Klinische toepassing en validatie van een assessment tool voor gameverslaving [Clinical Application and Validation of an Assessment Tool for Game Addiction]*. Rotterdam: IVO.

Wölfling, K., & Müller, K. W. (2010). Pathological gambling and computergame-addiction. *Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz, 53*(4), 306–312. doi:10.1007/s00103-010-1038-7

Wölfling, K., Thalemann, C., & Grüsser, S. M. (2008). Computerspielsucht: Ein psychopathologischer Symptomkomplez im Jugendalter [Computer gaming addiction: A psychopathological symptom complex in adolescence]. *Psychiatrische Praxis, 35*(5), 226–232. doi:10.1055/s-2007-986238

Wood, R. T. A., & Griffiths, M. D. (2007). Time loss whilst playing video games: Is there a relationship to addictive behaviours? *International Journal of Mental Health and Addiction, 5,* 141–149. doi:10.1007/s11469-006-9048-2

Wood, R. T. A., Griffiths, M. D., & Parke, A. (2007). Experiences of time loss among videogame players: An empirical study. *CyberPsychology & Behavior, 10,* 45–56. doi:10.1089/cpb.2006.9994

Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior, 9*(6), 772–775. doi:10.1089/cpb.2006.9.772

Yen, J. Y., Liu, T. L., Wang, P. W., Chen, C. S., Yen, C. F., & Ko, C. H. (2016). Association between Internet gaming disorder and adult attention deficit and hyperactivity disorder and their correlates: Impulsivity and hostility. *Addictive Behaviors, 29*(16), 30173. doi:10.1016/j.addbeh.2016.04.024

Zanetta Dauriat, F., Zermatten, A., Billieux, J., Thorens, G., Bondolfi, G., Zullino, D., & Khazaal, Y. (2011). Motivations to play specifically predict excessive involvement in massively multiplayer online role-playing games: Evidence from an online survey. *European Addiction Research, 17*(4), 185–189. doi:10.1159/000326070