Internet Gaming Addiction: The Case of Massively Multiplayer Online Role-Playing Games

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Abstract

Internet gaming disorder is one of the main types of Internet-related disorders. Recently, and despite inconsistencies in classification and limited data regarding the etiology of the condition, Internet gaming disorder has been included in Sect. 3 (research appendix) of the DSM-5. The focus of the current chapter was the dysfunctional involvement in a specific type of video game which has some inherent characteristics reinforcing its addictive nature: Massively Multiplayer Online Role-Playing Games (MMORPGs). MMORPGs are indeed one of the most recent and popular types of video games played worldwide, and problematic and uncontrolled involvement in playing MMORPGs is the most frequently reported activity by people seeking help for an Internet-related problem. In this chapter, we first described the specific structural characteristics of MMORPGs

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themselves (e.g., permanent world, reinforcement schedule, advancement systems, interface favoring social exchanges) and explained how they can increase their "addictive potential". Then, the main psychological factors (motives to play, impulsivity traits) were reviewed alongside neurobiological features (e.g., changes in neural circuitry involved in controlled regulation of behavior and reward drive) related to the development and maintenance of MMORPG addiction. The few available studies having tested the efficacy of treatments targeting Internet and video game addictions were also briefly considered. Limitations of existing data are emphasized, and avenues for further research proposed (both at the theoretical and clinical levels).

95.1   Introduction

There is growing evidence to support the claims that the use of the Internet can become dysfunctional and cause negative impact in daily living and has given birth to the construct of "Internet addiction." Internet addiction is generally considered as an addictive disorder that shares most features of drug addictions (i.e., salience, craving, tolerance, loss of control, mood modification, withdrawal, relapse). Over the last few years, there have been a number of calls to incorporate Internet addiction as a new diagnostic category in the next edition of the DSM. However, the DSM-5 task force recently decided that there is not enough empirical research to warrant inclusion of "Internet addiction" as a new psychiatric disorder in the DSM-5.

The validity of the Internet addiction construct is challenged by theoretical and empirical concerns. Internet addiction is indeed an umbrella construct that encompasses a variety of different dysfunctional behaviors related to the involvement in online activities that do not necessarily coexist (e.g., video game playing, cybersex, social networking, online gambling, etc.). Nevertheless, the empirical evidence regarding the risk factors that are shared among cyber addictions (i.e., factors implicated in the etiology of all cyber addictions) from those that are specific (i.e., factors implicated in the etiology of a specific cyber addiction, e.g., online gambling) is scarce. Another concern is raised by the elevated comorbidity rates between cyber addictions and other psychiatric disorders, which implies that cyber addictions can be either primary or secondary disorders (e.g., resulting from a depressive disorder) (Gentile et al. 2011).

Recently, and notwithstanding inconsistencies in classification and limited data regarding the course and the etiology of the condition, **Internet Gaming Disorder** has been included as a new clinical entity in Sect. 3 of the DSM-5 (Petry and O'Brien 2013). The goal of this section is to foster research on the conditions included therein. In this context, the current chapter focuses on the dysfunctional involvement in a specific type of video game which has some inherent characteristics reinforcing its addictive nature: Massively Multiplayer Online Role-Playing Games (MMORPGs). Problematic and uncontrolled involvement in playing MMORPGs is indeed the most frequently reported activity by people seeking help for an Internet-related problem (e.g., Thorens et al. 2013).

95.2   Massively Multiplayer Online Role Playing Games (MMORPGs)

95.2.1 Structural Characteristics of MMORPGs

MMORPGs are one of the most recent and popular types of video games played worldwide. An estimation of the total number of MMORPG players around the world is 20 million. MMORPGs are a type of computer role-playing game in which a large number of players interact with one another in a **persistent** virtual world – an environment that exists independently of the players. Consequently, both events and interactions between other players occur while the user is absent from the persistent world. In MMORPGs, players assume the role of a fictional character (often in heroic-fantasy-based worlds such as the one depicted by writer J. R. R. Tolkien in the saga "*Lord of the Rings*") and take control of many of that character's actions. Character creation typically involves various components such as the selection of an avatar (i.e., a visual representation of the character in the virtual world) but also specific skills and attributes that define the character (e.g., gender, race, profession, physical aspects). The concept of **advancement** is a fundamental characteristic of playing MMORPGs, implying that a user's character will acquire new powers, skills, and items (i.e., objects that can be found in the game, such as a special weapon or gold pieces) as rewards for succeeding in certain missions or quests (e.g., defeating an opponent or exploring a special place in the virtual world). Another important feature of playing MMORPGs is **social interaction**. It is indeed possible, when playing, to communicate easily with other players (written chat or audio). Furthermore, players can also regroup themselves in virtual social networks named guilds, which are persistent hierarchical organizations of characters with common objectives and back-grounds. Each guild has its own rules and users who want to be enrolled generally need to present their motivations and proofs that their characters meet the guild's requirement. These abovementioned specificities (permanent world, advancement and reinforcement system, social interactions aspects) have been proposed as **structural characteristics** reinforcing the addictive nature of this specific type of video game (e.g., King et al. 2010). It has, for example, been shown in a longitudinal study by Smyth (2007) that MMORPG players, in comparison to other types of video game players (e.g., arcade, console or solo-computer players), reported significantly more hours spent playing, worse health (e.g., more cigarettes smoked, less physical exercise, worse sleep quality, etc.), and greater interference in real-life socializing and academic work at a 1-month follow-up. This finding was confirmed in a recent cross-sectional study by Kuss et al. (2012) that emphasized MMORPG players (compared to those playing other types of video games) more often displayed signs of dysfunctional use. In the last years, a growing number of studies have focused on problematic involve-ment in video games and more particularly in the playing of MMORPGs (see Kuss and Griffiths 2012a, for a review). Most of these studies, which have considered dysfunctional use within the framework of "behavioral addictions", tried to identify the **psychological factors** and/or the **neurobiological correlates** involved in its development and maintenance.

95.2.2 Psychological Factors

Two types of psychological factors have been extensively investigated in relationship to MMORPGs overuse: (1) motives to play online and (2) individual differences in self-control.

Recent research on MMORPGs revealed that an individual's motivations for playing have an important role in the onset of online game involvement and in its continuation (Billieux et al. 2013; Yee 2006). A critical step regarding the comprehension of players' motives resulted from the work of Yee (2006) who explored players' motives through an online survey including 3,000 users of *World of Warcraft* (currently the most popular MMORPG worldwide). Yee's study revealed the existence of three broad types of motivations, namely, the achievement motive, the social motive, and the immersion (in a virtual world) motive. Each of these broad motives can actually be divided into subcomponents (e.g., the social factor comprises separate motives such as liking socializing while playing, playing to create new relationships, or seeking to solve problems through teamwork). A growing number of studies tried to identify motives to play online that predict the involvement in dysfunctional online gaming based on Yee's model of players' motives (e.g., Billieux et al. 2011, 2013; Kuss et al. 2012; Yee 2006). On the whole, these studies revealed that specific achievement- and immersion-related motives are strong predictors of problematic online gaming (as reflected by scales measuring symptoms of addiction and impact in daily life). Regarding achievement-related motives, problematic use was consistently associated with "advancement" (i.e., the desire to gain power, progress rapidly, and accumulate in-game symbols of wealth or status) and "mechanics" (i.e., interest in analyzing the underlying rules and system in order to optimize character performance). Regarding immersion-related motives, systematic relations were highlighted with "escapism" (i.e., the need to play to avoid thinking about real-life problems). The "role-play" component of the immersion motive (i.e., the aspiration to create a character with a background story and to interact with other players according to it) was also related to problem gaming, although the size of the highlighted associations was smaller ($r < 0.30$). In contrast, the available studies based on Yee's model consistently emphasized that social-related motives (e.g., playing to meet people or teamwork) are not related to problematic use. These data sustain that dysfunctional engagement in MMORPGs can either result from an uncontrolled drive to look for achievement in the game or be the consequence of a maladaptive strategy used to cope with negative affect (e.g., boredom, anxiety, dysphoria). This assumption has recently received support by a study of Billieux et al. (2013) using *avatar* monitoring techniques (i.e., measuring behaviors made by players in the virtual world by their character). Results of the study indeed highlighted that the escapism motive is unrelated to actual in-game behaviors, as well as to progression in the game (measured through an 8-month avatar monitoring), implying that escapers play to be immersed in a virtual reality more than to reach specific objectives in the game. In other words, it can be postulated that for certain problematic players, the game is used as a kind of dissociative technique to escape real life.

A large body of evidence tied dysfunctional video game use (and more largely Internet-related disorders) to poor self-control (e.g., traits of impulsivity and sensation seeking, lack of inhibitory control, impaired decision-making, reward drive) (see Billieux and Van der Linden 2012, for a review about Internet-related disorders and self-regulation).[1] This focus on self-control and impulsivity lies in the fact that dysfunctional video game involvement is most of the time conceptualized as an addictive behavior and that uncontrolled use is a key symptom of this disorder (King et al. 2013).

Several studies have highlighted that video game addicts have higher levels of self-reported impulsivity. In particular, a study by Gentile and colleagues (2011) found in a 2-year longitudinal study that greater impulsivity acts as a risk factor for the development of problematic use of video games. Impulsivity is however an umbrella construct that encompasses a combination of multiple and separable psychological dimensions. In the last decade, a growing number of researches supported a model that clarifies the multidimensionality of impulsivity by subdividing it into four dimensions, which are related but also specific (the UPPS model of impulsivity; Whiteside and Lynam 2001). These four dimensions are defined as follows: urgency, the tendency to act rashly when experiencing intense emotions (both positive and negative); premeditation, the tendency to take into account the consequences of an act before engaging in that act; perseverance, the capacity to remain focused on a boring and/or difficult task; and sensation seeking, the tendency to enjoy and pursue new and exciting activities. Notably, a growing number of studies have highlighted specific links between these impulsivity facets and various psychiatric disorders (e.g., substance abuse, problem gambling, compulsive buying, suicide ideations and attempts, aggressive behaviors). Recent studies showed that problematic MMORPG involvement (measured with scales assessing addiction symptoms, such as loss of control, as well as with the related impact on various spheres of daily life) is firstly predicted by the urgency facet of impulsivity (when controlling for other impulsivity components), although relationships with low premeditation and perseverance were also emphasized (Billieux et al. 2011, 2014). In contrast, the sensation-seeking facet of impulsivity was inconsistently related to problematic MMORPGs use (and more largely Internet overuse). A potential explanation for the absence of a systematic relationship between sensation seeking and dysfunctional MMORPGs use is that the questionnaires targeting this impulsivity component probably do not assess how people seek stimulation and rewards through online game involvement.

Recent evidence suggests that the various facets of impulsivity are related to specific psychological executive and motivational mechanisms involved in the regulation of behaviors. More precisely, it has been emphasized that three of the dimensions of impulsivity (urgency, lack of premeditation, lack of perseverance)

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[1]See Billieux and Van der Linden (2012) and Kuss and Griffiths (2012a) for comprehensive lists of publications having investigated self-regulation-related constructs in Internet and video games addictions.

are related to executive mechanisms underlying self-control abilities (e.g., inhibitory control, decision-making abilities, resistance to cognitive interference), whereas the last dimension (sensation seeking) rather depends on motivational mechanisms related to reward sensitivity and approach tendency. Behavior thus depends on the interaction of controlled (conscious) processes with automatic processes (less conscious). For example, when faced with a critical internal or external stimulus (e.g., a cybercafé, an unexpected pop-up related to an online game, an emotional state), a MMORPG player is susceptible to experience intrusive thoughts and/or craving about the game, which can automatically trigger the approach motivational system involved in reinforcement seeking. In such a situation, the capacity of this player to exert self-control (e.g., voluntary inhibiting the gaming behavior) will depend on the effectiveness of its controlled (or executive) processes. These last years, a few studies highlighted that video game addicts (in comparison to matched control participants) are characterized by impairments in a specific executive mechanism involved in self-control, namely, the ability to suppress prepotent responses (e.g., Littel et al. 2012). Furthermore, it was also demonstrated that individuals having dysfunctional involvement in MMORPGs display poor decision-making ability (e.g., Pawlikowski and Brand 2011). Although these studies shed some first light on the self-control deficits involved in uncontrolled MMORPGs use, further studies are required to confirm and strengthen the findings, as well as to explore other mechanisms involved in self-regulation (e.g., reinforcement learning, resistance to cognitive interference).

Other potential psychological factors involved in the etiology of online game addictions have been considered, although they remain currently less investigated than the factors mentioned above. For example, individual differences in self-esteem (i.e., the extent to which individuals view themselves as likeable and worthy) predict the involvement in online games. Several studies indeed revealed associations between a low level of self-esteem and symptoms of MMORPG addiction (e.g., Billieux et al. 2014), which suggests that excessive playing can serve to approach a more ideal virtual self by avoiding the actual self. Another line of research focused on the potential role of schizotypal personality (and related manifestations such as delusions) in the onset of excessive involvement in Internet-related activities, including MMORPGs (e.g., Mittal et al. 2013). Although preliminary, these studies suggested that schizotypy-related behaviors can promote the development and the perpetuation of over involvement in online games. Further research is thus required to extend our comprehension of the various psychological mechanisms (and their interactions) in the etiology of online game addictions.

95.2.3 Neurobiological Factors

A number of neurobiological factors have been found to be associated with Internet and online gaming addiction. In a recent systematic literature review, Kuss and

Griffiths (2012b) found that in eighteen empirical studies,[2] neuroimaging has been used in order to elucidate Internet and gaming addiction against the background of more traditional substance-related addictions. State-of-the-art neuroimaging techniques have been used in the included studies, namely, electroencephalograms (EEG), positron emission tomography (PET), single-photon emission computed tomography (SPECT), as well as functional and structural magnetic resonance imaging (fMRI and sMRI). With EEG, brain activity in the cerebral cortex is assessed. PET measures the level of positively charged electrons in the brain which provides an indicator for metabolic neuronal activity, whereas SPECT measures neuronal activity following the injection of radioactive tracers. With fMRI, brain blood oxygen levels are quantified in order to demarcate regions of activity. Finally, sMRI images brain structure, using methods such as voxel-based morphometry (VBM) and diffusion-tensor imaging (DTI).

Using these neuroimaging techniques, the systematic literature review revealed that Internet and gaming addiction are in no way inferior to substance-related addictions on three levels. On a biochemical level, frequent engagement in online and gaming activities has been shown to alter neuronal dopamine levels via reductions in dopamine transporter availability. This may lead to molecular dysfunctions in the dopaminergic system. On the level of neural networks, brain alterations appear as a result of excessive engagement with the Internet and online games. The brain adapts to the perpetual reinforcing stimulation and in turn becomes desensitized to natural reinforcers and thus needs more of the former, putting in motion a vicious cycle. The studies show that the function and structure of the orbitofrontal cortex gyrus changed as a consequence of excessive Internet use and gaming. The latter becomes more salient for the users who lose control over their behaviors. They have learned to use the Internet and games compulsively to recreate neuronal homeostasis. Finally, studies combining neuroimaging and behavioral techniques confirmed that people suffering from Internet and gaming addiction develop a number of cognitive deficits, including impairments in executive and attentional controls. However, on the bright side, a number of skills are advanced in this group. Studies indicate that the integration of perceptual information to the brain via the nervous system is facilitated, and hand-eye coordination is improved (Kuss and Griffiths 2012b).

In sum, state-of-the-art neuroimaging research offers compelling evidence for the similarities between Internet and gaming addiction with substance-related addictions. From the cited review, it appears that Internet and gaming addiction can be classed as behavioral addiction as the former fulfills a variety of characteristics that typify addictions. Correspondence between addictions exists on a molecular, neurocircuitry, and behavioral basis, indicating the addiction may best be conceptualized as a syndrome with common etiology, but different manifestation (Shaffer et al. 2004).

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[2]For a detailed listing and evaluation of included empirical studies, refer to the original systematic review paper (Kuss and Griffiths 2012b).

95.2.4 Treatment of MMORPG Addiction

Internet addiction in general and addiction to playing MMORPGs are relatively new clinical phenomena. Consequently, research on their treatment is limited. However, a couple of systematic studies with the goal of evaluating treatment effectiveness have been published (King et al. 2011; Liu et al. 2012). Each of these is briefly outlined.

King et al. (2011) made use of the gold standard of clinical trial evaluation, the CONSORT (Consolidated Standards of Reporting Trials) statement (Schulz et al. 2010), in order to evaluate Internet addiction treatment studies (including MMORPG addiction). The CONSORT statement sets out a number of quality indicators for pharmacological and non-pharmacological clinical trials, such as transparence in justifying and reporting study methodology. These include stating eligibility criteria for participants, description of respective treatments, and a power analysis for the utilized sample size (Schulz et al. 2010). Only eight studies[3] met the established criteria, including one randomized controlled trial. The included studies differed significantly in design, definition, and assessment of Internet addiction, treatment, follow-up assessments, randomization and blinding, sampling, and recruitment. As regards treatment, it was particularly varied ranging from cognitive-behavioral therapy (CBT), motivational interviewing (MI), reality training, and individually designed therapy including psychological and or counseling elements. Overall, treatment was provided by trained professionals or via especially developed computer programs, lasting between one session and 19 months in total (King et al. 2011).

For their empirical review, Liu et al. (2012) selected Internet addiction outcome studies based on whether they reported treatment outcomes, included young Internet addiction patients aged 9–23 years, and were carried out in China, resulting in a final sample of 24 studies.[4] In order to evaluate these studies, criteria from the CONSORT statement were adopted including objectivity, sample size, power, outcome, randomization, active comparison, baseline, manualization, treatment adherence rating, collateral report, objective measures, intention to treat (ITT) analysis, and blinding. In terms of the outcome, more than half of the included studies were considered "methodologically strong" in sequence generation and ITT analysis, however weak with regard to the remaining criteria. With regard to treatment approaches, exercise programs, cognitive-behavioral therapy, electroacupuncture, family therapy, group-based treatment, motivational interviewing, and psychotropic medication were used most commonly, with over 50 % of studies using multimodal techniques. On average, the effect size was high (i.e., 1.89), suggesting that Internet addiction therapy is efficacious; however, the quality of the results was found to be low. The highest effect size was found for the most prominent multimodal treatment, CBT combined with psychopharmacotherapy, i.e., 3.93, attesting to its efficaciousness (Liu et al. 2012).

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[3] For a detailed description of the included studies, please refer to the original review paper by King et al. (2011).

[4] A detailed description of studies is provided in Liu et al. (2012).

From the reported reviews of treatment studies, it appears that there is no single standardized evidence-based Internet addiction treatment available to date. The treatment studies published to date offer a wide range of therapy approaches, using dissimilar diagnostic criteria and heterogeneous treatment delivery. Taken collectively, more treatment research that fulfills high-quality standards is available in the Chinese-speaking rather than English-speaking world, indicating that the problem of Internet and MMORPG addiction may be more pressing in the former. From the few studies to date, it appears that a combination of CBT with pharmacotherapy yields the most promising results. The first cognitive-behavioral therapy manual for the treatment of computer game and Internet addiction has now been published in Germany (Wölfling et al. 2013). It combines group with individual therapy sessions on an outpatient basis. The manualization of Internet and MMORPG addiction treatment may be taken as first step toward the adoption of established clinical protocols, which will benefit managing risks, implementing research findings promptly, and standardizing treatment that is more cost-effective and efficient in the long run.

95.3   Conclusion

This chapter focused on a specific disorder of the spectrum of cyber addictions, namely, the dysfunctional involvement in MMORPGs. Having explained how some specific structural characteristics of the games themselves (e.g., permanent world, reinforcement schedule, advancement systems, interface favoring social exchanges) increase their "addictive potential," the main psychological factors (motives to play, impulsivity traits) were reviewed alongside neurobiological features (e.g., changes in neural circuitry involved in controlled regulation of behavior and reward drive) related to the development and maintenance of MMORPG addiction. The few available studies having tested the efficacy of treatments targeting Internet and video game addictions were also briefly reviewed.

In concluding, it is also noteworthy to mention some key points that should be taken into account both in clinical practice and empirical research:

- The empirical bases available to support the existence and exact nature of video game addictions (and other cyber addictions) are still scarce in comparison to those existing for substance addiction and some other behavioral addictions (e.g., pathological gambling). Empirical data about treatment efficacy is clearly lacking; however, the demand for treatment is likely to increase (e.g., Thorens et al. 2013).
- Video game addictions (and other cyber addictions) can be either primary or secondary disorders. Among other things, this implies that the prevalence rates reported in the literature are most likely overestimated and/or not representative of a specific disorder (e.g., sexual addiction versus online game addiction) and that the symptoms identified are not necessarily related to the postulated disorder.

- The studies now being carried out are becoming better both methodologically (e.g., development of in-game tracking techniques) and theoretically (e.g., development of psychological models of problematic use) although there is still a heavy reliance on self-selected samples. Further studies should thus focus on the recruitment of more representative samples.
- Recent studies challenged the demographic characteristics regarding individuals involved in playing online video games. First, this activity is no longer just a male adolescent or preadolescent activity, and online games are now also played by adults. The mean age of MMORPG players in many recent studies is often between 25 and 30 years old. In addition, it appears that there is an increasing feminization of gaming with more girls and women becoming gamers.
- The gaming studies field needs to develop better instrumentation to assess the symptomatology and prevalence of MMORPG addiction with sufficient specificity and sensitivity. In addition to diagnostic tools (i.e., scales used to differentiate problematic and non-problematic gamers), it would also be necessary to develop instruments that allow multidimensional scoring (e.g., loss of control, withdrawal, conflict, craving, compromised time control, hedonic aspects, mood regulation). Indeed, available studies often provided limited comprehension of the factors involved in the etiology of MMORPG addiction (e.g., personality traits, motives), as they have too often been conducted without considering its multifaceted nature. For example, a study designed to elucidate the role of self-regulation in dysfunctional online game symptomatology would benefit from using a scale able to measure aspects such as loss of control or pleasure seeking (psychological mechanisms or processes) as separate from aspects such as negative impact upon daily living (outcomes of the problematic behavior).
- Although MMORPGs appear to be more attractive video games when compared to "stand-alone" console-type games (due to structural characteristics such as 24/7 availability mentioned above), other less researched genres of online gaming (such as Real Time Strategy Games and First Person Shooters) may also require similar consideration in the future.

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