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Abstract

Technological forms of entertainment have become increasingly popular among both adults and adolescents. However, there have been a growing number of reports about excessive use of entertainment technology and potentially addictive use (e.g., to video games, mobile phones, the internet, etc.). The present chapter briefly overviews addiction to these entertainment products (i.e., 'technological addictions') by defining addiction and arguing that technological addictions are a type of behavioural addiction. The chapter also reviews the empirical literature concerning online gaming addiction and social networking addiction, as well as examining the differences between internet gaming addiction and internet addiction. The chapter demonstrates that issues encountered by contemporary researchers and clinicians regarding the assessment of online addictions appear complex and include several factors. It is concluded that there is a clear need to distinguish between addictions to the Internet and addictions on the Internet. Gambling or gaming addicts who chooses to engage in online gambling and gaming are not Internet addicts – the Internet is just the place where they conduct their chosen (addictive) behaviour. Based on empirical research, it is evident that excessive entertainment technology use appears to be at least potentially addictive. Further research is needed on whether activities such as video game addiction and Internet addictions such as social networking addiction are distinct clinical entities.

Introduction

The popularity of technology as an entertainment phenomenon has become an ever-increasing in the lives of both adults and adolescents. Coupled with this, there have been a growing number of reports in the media about excessive use of entertainment technology (e.g., video games, mobile phones, the internet, etc.). Although the concept of technological addictions appears to have its supporters in the media, there is much scepticism amongst the academic community – not least among those working in the field of addiction research. It is not hard to understand such attitudes. For many, the concept of technological addictions seems far-fetched particularly if their concepts and definitions of addiction involve the taking of psychoactive drugs. Despite the predominance of drug-based definitions of addiction, there is now a growing movement which views a number of behaviours as potentially

addictive including many behaviours which do not involve the ingestion of a psychoactive drug (e.g. gambling, computer game playing, exercise, sex, Internet use) (Griffiths, 2005). Such diversity has led to new all encompassing definitions of what constitutes addictive behaviour.

Defining addiction: Technological addiction as a behavioural addiction

It has been consistently argued that behaviours such as problematic gambling and problematic video game playing are no different from (say) alcoholism or heroin addiction in terms of the core components of addiction (Griffiths, 2005). If it can be shown that a behaviour such as excessive gambling can be a bona fide addiction then there is a precedent that any behaviour which can provide continuous rewards in the absence of a psychoactive substance can be potentially addictive (i.e., a behavioural as opposed to a chemical addiction). Such a precedent 'opens the floodgates' for other excessive behaviours to be theoretically considered as potential addictions (such as Internet and videogame use) (Griffiths, 2005).

For many years, it has been alleged that pathologies exist among excessive Internet users and video game players. For instance, as early as 1983, Soper and Miller claimed 'video game addiction' was like any other addiction and consisted of a compulsive behavioural involvement, a lack of interest in other activities, association mainly with other addicts, and physical and mental symptoms when attempting to stop the behaviour (e.g., the shakes). Griffiths (1998) and Young (1998) argued a similar case for excessive Internet users. Such addictions have been termed 'technological addictions' (Griffiths, 1995) and have been operationally defined as non-chemical (behavioural) addictions that involve excessive and problematic human-machine interaction. Technological addictions can either be passive (e.g., television), or active (e.g., video games) and usually contain inducing and reinforcing features that may contribute to the promotion of addictive tendencies (Griffiths, 1995). Technological addictions can thus be viewed as a subset of behavioural addictions and feature core components of addiction first outlined by Brown (1993) and modified by Griffiths; (2005), i.e., salience, mood modification, tolerance, withdrawal, conflict and relapse.

Research into the area of technological and online addictions is underpinned by three fundamental questions: (1) What is addiction? (2) Do technological and online addictions actually exist? (3) If technological and online addictions exist, what are people actually addicted to? The first question

continues to be a much-debated question both amongst psychologists within the field of addiction research as well as those working in other disciplines. For many years, the first author has operationally defined addictive behaviour as any behaviour that features all the core components of addiction (Griffiths, 1995; 2005). It is argued that any behaviour (e.g., video game playing, social networking, mobile phone use) that fulfils these six criteria is therefore operationally defined as an addiction. In the case of a technological addiction it would be:

- *Salience:* This occurs when some kind of technology use (e.g., video game playing, internet use, mobile phone use) becomes the most important activity in the person's life and dominates their thinking (preoccupations and cognitive distortions), feelings (cravings) and behaviour (deterioration of socialized behaviour). For instance, even if the person is not actually playing on a video game they will be thinking about the next time that they will be.

- *Mood modification:* This refers to the subjective experiences that people report as a consequence of engaging in their chosen technological behaviour and can be seen as a coping strategy (i.e., they experience an arousing "buzz" or a "high" or paradoxically tranquilizing feel of "escape" or "numbing").

- *Tolerance:* This is the process whereby increasing amounts of time engaged in a technological behaviour is required to achieve the former mood modifiying effects. This basically means that for someone engaged in Internet use or video game playing, they gradually build up the amount of the time they spend engaged in the behaviour.

- *Withdrawal symptoms:* These are the unpleasant feeling states and/or physical effects that occur when the technological behaviour is discontinued or suddenly reduced (e.g., the shakes, moodiness, irritability).

- *Conflict:* This refers to the conflicts between the technology user and those around them (interpersonal conflict), conflicts with other activities (job, schoolwork, social life, hobbies and interests) or from within the individual themselves (intrapsychic conflict and/or subjective feelings of loss of control) which are concerned with spending too much time engaged in activities such as Internet use or video game play.

- *Relapse:* This is the tendency for repeated reversions to earlier patterns of technology use to recur and for even the most extreme patterns typical of the height of excessive technology use to be quickly restored after periods of abstinence or control.

Having operationally defined addiction, it is the present authors' belief that technological and online addictions exist but that it affects only a small minority of users. There appear to be many people who use technology excessively but are not addicted as measured by these (or any other) criteria (Griffiths, 2010). The third question is perhaps the most interesting and the most important when it comes to researching in this field. What are people actually addicted to when they use the Internet, mobile phone, or play video games excessively? Is it the interactive medium of playing? Aspects of its specific style (e.g., an anonymous and disinhibiting activity)? The specific types of games (aggressive games, strategy games, etc.)? This has led to much debate amongst those of us working in this field. Research being carried out into Internet addiction may lead to insights about other technological addictions such as video game addiction and mobile phone addiction (and vice versa). For instance, Young (1999) has claimed that Internet addiction is a broad term covering a wide variety of behaviours and impulse control problems. This is categorized by five specific subtypes:

- *Cybersexual addiction:* Compulsive use of adult websites for cybersex and cyberporn.
- *Cyber-relationship addiction:* over-involvement in online relationships.
- *Net compulsions:* Obsessive online gambling, shopping or day-trading.
- *Information overload:* Compulsive web surfing or database searches.
- *Computer addiction:* Obsessive computer game playing (e.g. *Doom, Myst, Solitaire* etc.).

In reply to Young, Griffiths (2000a) argued that many of these excessive Internet users are not 'Internet addicts' but just use the Internet excessively as a medium to fuel other addictions. Put very simply, a gambling addict or a video game addict who engages in their chosen behaviour online is not addicted to the Internet. The Internet is just the place where they engage in the behaviour. However, in contrast to this, there are case study reports of individuals that appear to be addicted to the Internet itself (e.g. Young, 1998; Griffiths, 1998; 2000b). These are usually people (and very often adolescents in their late teenage years) that use Internet chat rooms or play fantasy role playing games - activities that they would not engage in except on the Internet itself. These individuals to some extent are engaged in text-based virtual realities and take on other social personas and social identities as a way of making users feel good about themselves (Griffiths, 2000b). In these cases, the Internet may provide an alternative reality to the user and allow them feelings of immersion and anonymity that may lead to an

altered state of consciousness. This in itself may be highly psychologically and/or physiologically rewarding. Obviously for those playing online computer games (theoretically a combination of both Internet use and video game play), these speculations may provide insights into the potentially addictive nature of video games for those playing in this medium.

The cognitive-behavioural model of pathological internet use [PIU] (Davis, 2001) was developed to describe the set of symptoms related to PIU and its etiology. This model was very influential in the early 2000s because it was the first to clearly distinguish between specific pathological internet use [SPIU] and generalized pathological internet use [GPIU]. As noted by Davis, SPIU can be broadly defined as a type of internet addiction where people are dependent on a specific function of the internet (e.g., gaming), whereas GPIU relates to a general, multidimensional overuse of the internet (e.g., use of many different online applications).

One of the salient features of this model is the emphasis on the importance and role of maladaptive cognitions in the development and maintenance of PIU rather than focusing on the well-documented behavioural factors (e.g., withdrawal, tolerance) associated with PIU. In order to explain the nature of the cognitive theory of PIU, Davis introduced the concepts of distal and proximal contributory causes of PIU. Distal causes include preexisting psychopathology (e.g., depression, social anxiety, substance dependence), and behavioural reinforcement (provided by the internet itself throughout the experience of new functions and situational cues which contribute to conditioned responses). Proximal causes involve maladaptive cognitions that are seen as a sufficient condition that can lead to both GPIU and SPIU, and also cause the set of symptoms associated with PIU. Another important proximal cause that contributes to the causal pathway of GPIU is related to the social context of the individual (e.g., lack of social support, social isolation). As hypothesized by Davis, GPIU involves spending abnormal amounts of time on the internet, either wasting time with no directive purpose or spending excessive amounts of time in chat rooms. Moreover, procrastination is also assumed to play an important role in both the development and maintenance of GPIU.

In this model, symptoms of PIU primarily derive from maladaptive cognitions. These symptoms relate more to cognitive symptoms and as such may include obsessive thoughts about the internet, diminished impulse control, inability to cease internet use, as well as the generalized feeling that the internet is the only place where individuals feel good about themselves. Other symptoms may include

thinking about the internet while offline, anticipating future time online, decreasing interest for other activities or hobbies, and social isolation.

More recently, Brand, Young and Laier (2014) further developed Davis' model by taking into account important neuropsychological mechanisms and control processes mediated by executive functions, and prefrontal cortical areas. Therefore, this model attempts to explain and understand the development and maintenance of both generalized internet addiction [GIA] and specific internet addiction [SIA] (e.g., Internet Gaming Disorder). According to Brand et al., it is important to distinguish between functional internet use, GIA, and SIA. While functional internet use encompass the use of the internet as a tool for dealing with personal needs and goals in everyday life in a healthy way, both GIA and SIA may serve different purposes in the context of addiction. Furthermore, in the development and maintenance of GIA, the user has some needs and goals that can be satisfied using certain internet applications. It is assumed that psychopathological symptoms (e.g., depression, anxiety) are predisposing factors for developing GIA. Moreover, social cognitions (e.g., perceived social isolation, lack of offline support) are also assumed to be related to GIA.

Accordingly, particular emphasis is given to internet use expectancies as it may involve anticipations of how the internet can be helpful for distracting individuals from thinking about their problems and/or escaping from reality. Such activity can also be used to enhance positive mood states and/or minimize negative mood states. These expectancies may also interact with the user's general coping style and self-regulation capacities. Therefore, when going online, the user receives reinforcement in terms of dysfunctional coping strategies with negative feelings or problems in everyday life. While internet use expectancies are positively reinforced, given the strong reinforcement character of certain internet applications, the cognitive control concerning the internet use becomes more effortful. This should particularly be the case if internet-related cues interfere with executive processes.

In the development and maintenance of SIA it is argued by Brand et al. (2014) that psychopathological symptoms are also particularly involved in this type of internet addiction. Therefore, it is hypothesized that specific person's predispositions increase the probability that an individual receives gratification from the use of certain applications and overuses these applications again. In this framework, it is postulated that the expectancy that such internet applications can satisfy certain desires increases the likelihood that these applications will be used frequently, and that the individual begins to lose of

control over the use of such applications. Consequently, gratification is experienced and therefore the use of such applications and also the specific internet use expectancies and the coping style are reinforced positively. Another assumption of this perspective for understanding SIA, is that the more general psychopathological tendencies (e.g., depression, social anxiety) are negatively reinforced due to the fact that additional specific internet applications can be used to distract from problems in the real life or to avoid negative feelings, such as loneliness or social isolation. Contrary to the theory proposed by Davis where the model of PIU has been put to test by developing a theory-driven instrument to assess internet addiction, the theoretical framework put forth by Brand et al. still remains to be tested empirically.

To date, there have been many types of excessive and/or problematic activity that have been conceptualized as a technological and/or online addiction. This has included television addiction, mobile phone addiction, video game addiction, internet addiction, social networking addiction, online auction addiction, online sex addiction, and online gambling addiction. Due to space restraints, a review of all of these different types of entertainment addictions is beyond the scope of this chapter. Therefore, the rest of this chapter briefly overviews the empirical research on two entertainment addictions – online gaming addiction and social networking addiction.

A brief overview of 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 (e.g., Egli & Meyers, 1984; Keepers, 1990; Shotton, 1989; Soper & Miller, 1983). However, these studies were somewhat observational, anecdotal, and/or case studies, primarily based on samples of teenage males, mostly based on a particular type of video game using a particular medium (i.e., 'pay-to-play' arcade video games). The 1990s saw a small but significant increase of research into video game addiction with all of these studies being carried out in the UK and on adolescents typically surveying children in school settings (e.g., Griffiths & Hunt, 1998; Phillips, Rolls, Rouse & Griffiths, 1995). In contrast to the early 1980s studies, these studies mainly examined non-arcade video game playing (i.e., home console games, handheld games, PC gaming). However, all of these studies were self-report surveys, relatively small scale and the main problem was that all of them assessed video game addiction

using adapted versions of the DSM-III-R or DSM-IV criteria for pathological gambling. Although there are clearly many similarities between gambling and video gaming, they are different behaviours and specific video game screening instruments should have been developed. Based on further analysis of the adapted DSM criteria used, these studies were later criticized as being more likely to be assessing video game preoccupation rather than video game addiction (Charlton, 2002).

The 2000s saw a substantial growth in the number of studies on video game addiction particularly as gaming expanded into the new online medium where games could be played as part of a gaming community (i.e., massively multiplayer online role playing games [MMORPGs] such as *World of Warcraft* and *Everquest*). According to a number of systemeic reviews (e.g., Kuss & Griffiths, 2012) approximately sixty studies were published on gaming addiction between 2000 and 2010 and a vast majority of these examined MMORPG addiction and was not limited to the study of adolescent males. Furthermore, many of these studies collected their data online and a significant minority of studies examined various other aspects of video game addiction using non-self-report methodologies. These include studies using polysomnographic measures and visual and verbal memory tests (Dworak, Schierl, Bruns & Struder, 2007), medical examinations including the patient's history, and physical, radiologic, intraoperative, and pathologic findings (Cultrara & Har-El, 2002), functional Magnetic Resonance Imaging (Han, Hwang & Renshaw, 2010; Hoeft, Watson, Kesler, et al, 2008; Ko, Liu, Hsiao, et al 2009), electroencephalography (Thalemann, Wölfling & Grüsser, 2007), and genotyping (Han, Lee, Yang, et al, 2007).

When looking at estimated prevalence rates of problematic video gaming, they range from 1.7% (e.g., Rehbein, Kleimann & Mossle, 2010), to 8-10% among general samples (e.g., Gentile, Choo, Liau, et al, 2011). Prevalence rates among video game players were in some cases much higher (e.g., Grusser, Thalemann & Griffiths, 2007; Hussain, Griffiths & Baguley, 2012). These studies also indicate that, in general, males are significantly more likely than females to report problems relating to their gaming. According to King and colleagues (2012; 2013), the differences in methods of assessing game-based problems may partly account for differences in prevalence rates. Furthermore, many studies fail to assess prior problems (i.e., lifetime prevalence). King, et al (2012; 2013) also noted that some studies do not consider subclinical cases (i.e., meeting some but not all criteria for problematic use), and the presence of co-morbid psychopathology is not routinely assessed.

From a substantive perspective, there are some generalizations that can be made with regard to the demographic characteristics of gamers and problem gamers. The literature, to date, suggests that adolescent males and young male adults appear to be at greater risk of experiencing problematic video game play. However, the course and severity of these problems is not well known and the finding that this group is more at risk may be a consequence of sampling bias as well as the fact that this group plays video games more frequently than other socio-demographic groups (Griffiths, Kuss & King, 2012). It has also been suggested that university students may be especially vulnerable to developing problematic video 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, Delfabbro & Griffiths, 2012).

Irrespective of whether problematic video game play can be classed as an addiction, there is now a relatively large number of studies all indicating that excessive video game play can lead to a wide variety of negative psychosocial consequences for a minority of affected individuals. These were summarised by Griffiths et al (2012) and 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 behaviour and hostility, maladaptive coping, decreases in verbal memory performance, maladaptive cognitions, and suicidal ideation. This list of potential psychosocial consequences clearly indicates that excessive gaming is an issue irrespective of whether it is an addiction. In addition to the reported negative psychosocial consequences, griffiths et al (2012) also noted there are many reported health and medical consequences that may result from excessive video game playing. These include epileptic seizures, auditory hallucinations, enuresis, encoprisis, obesity, wrist pain, neck pain, tenosynovitis, blisters, calluses, sore tendons, and numbness of fingers, hand-arm vibration syndrome, sleep abnormalities, psychosomatic challenges, and repetitive strain injuries.

A number of studies have examined the role of different personality factors, comorbidity factors, and biological factors, and their association with gaming addiction. In relation to personality traits, a review by Griffiths et al. (2012) reported that gaming addiction had been shown to have association 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. It is hard to assess the etiological significance of these associations with gaming addiction as they may not be unique to the disorder. Further research is therefore needed. Research has also shown gaming addiction to be associated with a variety of comorbid disorders. This includes 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 fMRI, biological research has shown that gaming addicts show similar neural processes and increased activity in brain areas associated with substance-related addictions and other behavioural addictions, such as pathological gambling (significant activation in the left occipital lobe, parahippocampal gyrus, dorsolateral prefrontal cortex, nucleus accumbens, right orbitofrontal cortex, bilateral anterior cingulate, medial frontal cortex, and the caudate nucleus (Han et al. 2010; Hoeft et al. 2008; Ko et al. 2009). 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) (Han et al. 2007) which suggests that among some players there might be some genetic predisposition to develop video game addiction.

But what is it that makes gaming so addictive for the small minority? For me, addiction is all about constant reinforcement, or put more simply, being constantly rewarded while playing the game. Gaming rewards can be physiological (such as feeling 'high' or getting a 'buzz' while playing or beating your personal high score), psychological (such as feeling you have complete control in a specific situation or knowing that your strategic play helped you win), social (such as being congratulated by fellow gamers when doing something well in the game) and, in some cases, financial (such as winning a gaming tournament). Most of these rewards are – at least to some extent – unpredictable. Not knowing when the next reward will come keeps some players in the game. In short, they carry on gaming even though they may not have received an immediate reward. They simply hope that another reward is 'just around the corner' and keep on playing.

As a consequence of this upsurge in research over the last decade, the Substance Use Disorder Work Group (SUDWG) recommendeded that the DSM-5 (American Psychiatric Association, 2013) include a sub-type of 'internet gaming disorder' [IGD] in Section 3, the Appendix, ('Emerging Measures and

Models'). The main text includes all the mental disorders that have been clinically identified and that have robust empirical support. Section 3 of the DSM is outside of the main text and features disorders that have some empirical evidence but that need further empirical validation before appearing in the main text. According to Petry and O'Brien (2013), IGD will not be included as a separate mental disorder in the main text of the DSM until the (i) defining features of IGD have been identified, (ii) reliability and validity of specific IGD criteria have been obtained cross-culturally, (iii) prevalence rates have been determined in representative epidemiological samples across the world, and (iv) etiology and associated biological features have been evaluated.

One of the key reasons that IGD was not included in the main text of the DSM-5 was that the SUDWG concluded that no standard diagnostic criteria were used to assess gaming addiction across these many studies. A recent review of instruments assessing problematic, pathological and/or addictive gaming by King and colleagues (2013) reported that 18 different screening instruments had been developed, and that these had been used in 63 quantitative studies comprising 58,415 participants. This comprehensive review identified both strengths and weaknesses of these instruments. The main strengths of the instrumentation included the: (i) the brevity and ease of scoring, (ii) excellent psychometric properties such as convergent validity and internal consistency, and (iii) robust data that will aid the development of standardized norms for adolescent populations. However, the main weaknesses identified in the instrumentation included: (i) core addiction indicators being inconsistent across studies, (iii) a general lack of any temporal dimension, (iii) inconsistent cut-off scores relating to clinical status, (iv) poor and/or inadequate inter-rater reliability and predictive validity, and (v) inconsistent and/or dimensionality. It has also been noted by a number of authors that the criteria for IGD assessment tools are theoretically based on a variety of different potentially problematic activities including substance use disorders, pathological gambling, and/or other behavioural addiction criteria. There are also issues surrounding the settings in which diagnostic screens are used as those used in clinical practice settings may require a different emphasis that those used in epidemiological, experimental and neurobiological research settings.

The fact that IGD was included in Section 3 of the DSM-5 appears to have been well received by researchers and clinicians in the gaming addiction field (and by those individuals that have sought treatment for such disorders and had their experiences psychiatrically validated and feel less stigmatized). Irrespective of approach or model, the components and dimensions that comprise

addiction outlined at the start of this chapter are very similar to the IGD criteria in Section 3 of the DSM-5. For instance, the six addiction components directly map onto the nine proposed criteria for IGD (of which five or more need to be endorsed and resulting in clinically significant impairment). More specifically: (1) *preoccupation with internet games* [salience]; (2) *withdrawal symptoms when internet gaming is taken away* [withdrawal]; (3) *the need to spend increasing amounts of time engaged in internet gaming* [tolerance], (4) *unsuccessful attempts to control participation in internet gaming* [relapse/loss of control]; (5*) loss of interest in hobbies and entertainment as a result of, and with the exception of, internet gaming* [conflict]; (6) *continued excessive use of internet games despite knowledge of psychosocial problems* [conflict]; (7) *deception of family members, therapists, or others regarding the amount of internet gaming* [conflict]; (8) *use of the internet gaming to escape or relieve a negative mood* [mood modification]; and (9) *loss of a significant relationship, job, or educational or career opportunity because of participation in internet games* [conflict].

However, for IGD to be included in the section on 'Substance-Related and Addictive Disorders' the gaming addiction field must unite and start using the same assessment measures so that comparisons can be made across different demographic groups and different cultures. For epidemiological purposes, Koronczai and colleagues asserted that the most appropriate measures in assessing problematic online use (including internet gaming) should meet six requirements. Such an instrument should have: (i) brevity (to make surveys as short as possible and help overcome question fatigue); (ii) comprehensiveness (to examine all core aspects of IGD as possible); (iii) reliability and validity across age groups (e.g., adolescents vs. adults); (iv) reliability and validity across data collection methods (e.g., online, face-to-face interview, paper-and-pencil); (v) cross-cultural reliability and validity; and (vi) clinical validation. It was also noted that an ideal assessment instrument should serve as the basis for defining adequate cut-off scores in terms of both specificity and sensitivity. To fulfill all these requirements, future research should adjust the currently used assessment tools to the newly accepted DSM-5 criteria and take much more efforts to reach and study clinical samples, which is an unequivocal shortcoming of internet gaming research .

A brief overview of social networking addiction

Social Networking Sites (SNSs) are virtual communities where users can create individual public profiles, interact with real-life friends, and meet other people based on shared interests [1]. SNS usage patterns from both consumer research and empirical research indicate that overall, regular SNS use has

increased substantially over the last few years (Kuss & Griffiths, 2011). SNSs are predominantly used for social purposes, mostly related to the maintenance of established offline networks, relative to individual ones (Kuss & Griffiths, 2011). However, recent evidence suggests that individuals may feel compelled to maintain their online social networks in a way that may, in some circumstances, lead to using SNSs excessively.

Based on the relatively sparse literature to date, it would appear that in some individuals, SNS addiction incorporates the experience of the 'classic' addiction symptoms, namely mood modification (i.e., engagement in SNSs leads to a favourable change in emotional states), salience (i.e., behavioural, cognitive, and emotional preoccupation with the SNS usage), tolerance (i.e., ever increasing use of SNSs over time), withdrawal symptoms (i.e., experiencing unpleasant physical and emotional symptoms when SNS use is restricted or stopped), conflict (i.e., interpersonal and intrapsychic problems ensue because of SNS usage), and relapse (i.e., addicts quickly revert back to their excessive SNS usage after an abstinence period).

It is generally accepted that a combination of biological, psychological and social factors contributes to the etiology of addictions that may also hold true for SNS addiction (Griffiths, Kuss & Demetrovics, 2014). From this it follows that SNS addiction shares a common underlying etiological framework with other substance-related and behavioural addictions. However, due to the fact that the engagement in SNSs is different in terms of the actual expression of (internet) addiction (i.e., pathological use of SNSs rather than other internet applications), the phenomenon may be worthy of individual consideration, particularly when considering the potentially detrimental effects of both substance-related and behavioural addictions on individuals who experience a variety of negative consequences because of their addiction.

According to a recent review (Griffiths, et al, 2014), the twenty or so empirical studies examining SNS addiction fall into one of four types: (i) self-perception studies of social networking addiction, (ii) studies of social networking addiction utilizing a social networking addiction scale, (iii) studies examining the relationship between social networking and other online addictions, and (iv) studies examining social networking addiction and interpersonal relationships. The review noted that all the studies suffered from a variety of methodological limitations. Many of the studies attempted to assess SNS addiction, but mere assessment of addiction tendencies does not suffice to demarcate real

pathology. Most of the study samples were generally small, specific, self-selected, convenient, and skewed with regards to young adults and female gender (e.g., Andraessen, et al, 2012; Cabral, 2011; Cam & Isbulan, 2012; Elphinston & Noller, 2011; Koc & Gulyagci, 2013). Turel & Serenko, 2012). This may have led to the very high addiction prevalence rates (up to 34%) reported in some studies as individuals from these socio-demographic groups are likely to be more heavy social networking users. Consequently, empirical studies need to ensure that they are assessing addiction rather than excessive use and/or preoccupation.

It was recently noted that for many researchers, Facebook addiction has become almost synonymous with social networking addiction (Griffiths, 2012b). However, Facebook is just one of many websites where social networking can take place. Most of the scales that have been developed have specifically examined excessive Facebook use such as the Bergen Facebook Addiction Scale (Andraessen, et al, 2012), the Facebook Addiction Scale (Cam & Isbulan, 2012), and the Facebook Intrusion Questionnaire (Elphinston & Noller, 2011), i.e., addiction to one particular commercial company's service (i.e., Facebook) rather than the whole activity itself (i.e., social networking). The real issue here concerns what people are actually addicted to and what the new Facebook addiction tools are measuring.

For instance, Facebook users can play games like *Farmville*, can gamble on games like poker, can watch videos and films, and can engage in activities such as swapping photos or constantly updating their profile and/or messaging friends on the minutiae of their life (Griffiths, 2012b; Kuss & Griffiths, 2011). Therefore, 'Facebook addiction' is not synonymous with 'social networking addiction' – they are two fundamentally different things as Facebook has become a specific website where many different online activities can take place – and may serve different purposes to various users. What this suggests is that the field needs a psychometrically validated scale that specifically assesses 'social networking addiction' rather than Facebook use. In the aforementioned scales, social networking as an activity is not mentioned, therefore the scale does not differentiate between someone potentially addicted to *Farmville* or someone potentially addicted to constantly messaging Facebook friends.

To explain the formation of SNS addiction, Turel and Serenko (2012) summarized three overarching theoretical perspectives that may not be mutually exclusive:

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- *Cognitive-behavioural model:* This model emphasizes that 'abnormal' social networking arises from maladaptive cognitions and is amplified by various environmental factors, and eventually leads to compulsive and/or addictive social networking.

- *Social skill model:* This model emphasizes that 'abnormal' social networking arises because people lack self-presentational skills and prefer virtual communication to face-to-face interactions, and it eventually leads to compulsive and/or addictive use of social networking.

- *Socio-cognitive model:* This model emphasises that 'abnormal' social networking arises due to the expectation of positive outcomes, combined with internet self-efficacy and deficient internet self-regulation eventually leads to compulsive and/or addictive social networking behaviour.

Based on these three models, Xu and Tan (2012) suggest that the transition from normal to problematic social networking use occurs when social networking is viewed by the individual as an important (or even exclusive) mechanism to relieve stress, loneliness, or depression. They contend that those who frequently engage in social networking are poor at socializing in real life. For these people, social media use provides such people continuous rewards (e.g., self-efficacy, satisfaction) and they end up engaging in the activity more and more, eventually leading to many problems (e.g., ignoring real life relationships, work/educational conflicts, etc.). The resulting problems may then exacerbate individuals' undesirable moods. This then leads such individuals to engage in the social networking behaviour even more as a way of relieving dysphoric mood states. Consequently, when social network users repeat this cyclical pattern of relieving undesirable moods with social media use, the level of psychological dependency on social networking increases.

Whether social networking addiction exists is debatable depending upon the definition of addiction used, but there is clearly emerging evidence that a minority of social network users experience addiction-like symptoms as a consequence of their excessive use (Griffiths, et al, 2014). Studies endorsing only a few potential addiction criteria are not sufficient for establishing clinically significant addiction status. Similarly, significant impairment and negative consequences that discriminate addiction from mere abuse have (to date) generally not been assessed in published studies. Thus, future studies have great potential in addressing the emergent phenomenon of SNS addiction by means of applying better methodological designs, including more representative samples, and using more reliable and valid addiction scales so that current gaps in empirical knowledge can be filled.

In addition, specific attention needs to be paid to selecting larger samples that are representative of a broader population in order to increase the respective study's external validity. The generalizability of results is essential in order to demarcate populations at risk for developing addiction to SNSs. Similarly, it appears necessary to conduct further psychophysiological studies in order to assess the phenomenon from a biological perspective. Furthermore, clear-cut and validated addiction criteria need to be assessed. It is insufficient to limit studies into addiction to assessing just a few criteria. The differentiation of pathology from high frequency and problematic usage necessitates adopting frameworks that have been established by the international classification manuals. Moreover, in light of clinical evidence and practice, it appears essential to pay attention to the significant impairment that SNS addicts experience in a variety of life domains as a consequence of their abusive and/or addictive behaviours.

Similarly, the results of data based on self-reports are not sufficient for diagnosis because research suggests that they may be inaccurate (Griffiths et al., 2014). Conceivably, self-reports may be supplemented with structured clinical interviews, and further case study evidence as well as supplementary reports from the users' significant others. Research into social networking addiction is needed specifically in relation to clinical applicability and criteria for diagnosis. Furthermore, research is needed to examine gender differences as there appears to be a higher prevalence of problems among females (as opposed to other problematic online behaviours such as gaming addiction which is more prevalent among males; Kuss & Griffiths, 2012a). Such observations strengthen the rationale for a clear-cut social networking addiction classification rather than an umbrella term of 'internet addiction'.

Internet addiction and internet gaming addiction

As can be seen from earlier in the chapter, research into online addictions has greatly increased. Alongside this, there have been scholarly debates about whether internet addiction really exists. Some may argue that because internet use does not involve the ingestion of a psychoactive substance, then it should not be considered a genuine addictive behaviour. However, the latest (fifth) edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) (American Psychiatric Association, 2013) re-classified 'Gambling Disorder' as an addiction disorder rather than as a disorder of impulse control. The implications of this reclassification are potentially far-reaching. The most significant implication is that if an activity that does not involve the consumption of drugs (i.e., gambling) can be a genuine

addiction accepted by the psychiatric and medical community, there is no theoretical reason why other problematic and habitual behaviours (e.g., shopping, work, exercise, sex, video gaming, etc.) cannot be classed as a bone fide addiction.

There have also been debates among scholars that consider excessive problematic internet use to be a genuine addiction as to whether the those in the field should study generalized internet addiction (the totality of all online activities) and/or specific addictions on the internet such as internet gambling, internet gaming and internet sex (Griffiths, 2012; Szabo & Griffiths, 2014). As noted in an earlier section of this chapter, Griffiths (2000a) has constantly argued that there is a fundamental difference between addictions *on* the internet, and addictions *to* the internet. More specifically, it has been argued that the overwhelming majority of individuals that are allegedly addicted to the internet are not internet addicts but were individuals that use the medium of the internet as a vehicle for other addictions (Griffiths, 2000a).

Prior to the publication of the latest DSM-5 (American Psychiatric Association, 2013), there had also been debates as to whether 'internet addiction' should be introduced into the text as a separate disorder (Petry & O'Brien, 2013). As noted earlier, the DSM-5 now includes a sub-type of problematic internet use (i.e., internet gaming disorder [IGD]) in Section 3 ('Emerging Measures and Models'). However, far from clarifying the debates surrounding generalized versus specific internet use disorders, the section of the DSM-5 discussing IGD noted that:

"There are no well-researched subtypes for Internet gaming disorder to date. 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 consequence associated with Internet gaming disorder vary by game type…Internet gaming disorder has significant public health importance, and additional research may eventually lead to evidence that Internet gaming disorder (also commonly referred to as Internet use disorder, Internet addiction, or gaming addiction) has merit as an independent disorder" (p.796).

Two immediate problematic issues arise from these assertions. Firstly, IGD is clearly seen as synonymous with internet addiction as the text claims that internet addiction and internet use disorder are simply other names for IGD. Secondly – and somewhat confusingly – it is asserted that IGD

(which is by definition internet-based) can also include offline gaming disorders.

With regards to the first assertion, internet addiction and internet gaming addiction are not the same and recent empirical research clearly shows that to be the case. For instance, Király and colleagues (2014) examined the interrelationship and the overlap between internet use disorder (IAD) and IGD in terms of (amongst other variables) gender, and time spent using the internet and/or online gaming, and preferred online activities. They collected their data from a nationally representative sample of over 2,000 adolescents. They found that IGD was much more strongly associated with being male, and that IAD was positively associated with online chatting, online gaming, and social networking while IGD was only associated with online gaming. The authors argued that IGD appears to be a conceptually different behaviour than internet use disorder and that their data supported the notion that IAD and IGD are separate nosological entities. A further complicating factor is that many researchers have used the Internet Addiction Test to assess online gaming addiction. This may have been one of the reasons as to why the DSM-5 asserted that IGD and IAD are the same disorder.

The second assertion that IGD can include offline video gaming is both baffling and confusing. Some researchers consider video games as the starting point for examining the characteristics of gaming disorder (Griffiths, Kuss & King, 2012), while others consider the internet as the main platform that unites different addictive internet activities, including online games (Young, 1998; 1999). For instance, it has been argued that although all addictions have particular and idiosyncratic characteristics, they share more commonalities than differences (i.e., salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse), and likely reflects a common etiology of addictive behaviour (Griffiths, 2005). For the present authors, IGD is clearly a sub-type of video game addiction. Similarly, Porter and colleagues (2010) do not differentiate between problematic video game use and problematic online game use. They conceptualized problematic video game use as excessive use of one or more video games resulting in a preoccupation with and a loss of control over playing video games, and various negative psychosocial and/or physical consequences. For Young (1999) – and as noted earlier – 'cyber-relationship addictions', 'cyber-sexual addictions', 'net compulsions' (gambling, day trading) and 'information overload' are all internet addictions. However, many would argue that these – if they are addictions – are addictions *on* the internet, not *to* it.

However, recent studies (Demetrovics et al., 2012; Kim & Kim, 2010) have made an effort to integrate both approaches. For instance, Kim and Kim (2010) claim that neither the first nor the second approach adequately captures the unique features of Massively Multiplayer Online Role-Playing Games (MMORPGs), and argue an integrated approach is a necessity. More specifically they argue that: *"Internet users are no more addicted to the Internet than alcoholics are addicted to bottles"* (p. 389). The internet is just a channel through which individuals may access whatever content they want (e.g., gambling, shopping, chatting, sex). On the other hand, online games differ from traditional standalone games, such as offline video games, in important aspects such as the social dimension or the role-playing dimension that allow interaction with other real players. Consequently, it could be argued that IGD can either be viewed as a specific type of video game addiction, or as a variant of internet addiction, or as an independent diagnosis. However, the idea that IGD can include offline gaming disorders does little for clarity or conceptualization.

Finally, it is also worth mentioning that there are some problematic online behaviours that could be called internet addictions as they can only take place online. The most obvious activity that fulfills this criterion is social networking as is a 'pure' online activity and does not and cannot take place offline (Griffiths, Kuss & Demetrovics, 2014). Other activities such as gambling, gaming, and shopping can still be engaged in offline (as gamblers can go to a gambling venue, gamers can play a standalone console game, shoppers can go to a retail outlet). However, those engaged in social networking would not (if unable to access the internet) walk into a big room of people and start chatting to them all. However, even if social networking addiction is a genuine internet addiction, social networking itself is still a specific online application and could still be considered an addiction on the internet, rather than to it.

Based on empirical evidence, internet gaming addiction (or any of the alternate names used to describe problematic gaming) is not the same as internet addiction. The gaming studies field needs conceptual clarity but as demonstrated, the DSM-5 itself is both misleading and misguided when it comes to the issue of internet gaming disorder.

Conclusion

This chapter has demonstrated that research into entertainment addictions is becoming an increasingly studied phenomenon. The amount and the quality of research in the gaming addiction field has progressed much over the last decade but is still in its infancy compared to other more established behavioural addictions, such as pathological gambling. There have also been several noticeable trends that can be drawn from reviewing the literature on gaming addiction:

- There has been a significant increase in empirical research decade by decade since the early 1980s.

- There has been a noticeable (and arguably strategic) shift in researching the mode of video game play. In the 1980s, research mainly concerned 'pay-to-play' arcade video games. In the 1990s, research mainly concerned standalone (offline) video games played at home on consoles, PCs or handheld devices. In the 2000s, research mainly concerned online massively multiplayer video games.

- There has been a noticeable shift in how data are collected. Up until the early 2000s, data about video game behaviour was 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 behavioural tracking studies.

- There has been increased research on adult (i.e., non-child and non-adolescent) samples reflecting the fact that the demographics of gaming have changed.

- There has been increasing sophistication in relation to issues concerning assessment and measurement of problematic video game play 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 (2013) assert that to enable future advances in the development and testing of interventions for video game-related problems, there must be some consensus among clinicians and researchers as to the precise classification of these problems.

Clearly more research is needed on whether activities such as video game addiction and Internet addictions such as social networking addiction are distinct clinical entities. From the research, it is evident that excessive entertainment technology use appears to be at least potentially addictive. With respect to video games, there is also a need for a general taxonomy of video games as it could be the case that particular types of games are more addictive than others. Another major problem is that video games can be played in lots of different ways including handheld consoles, on a personal computer, home video game consoles, on arcade machines, on the internet, and on other portable devices (e.g., mobile phones, i-Pods). It may be the case that some of these media for playing games (such as in an arcade or on the Internet) may be more addictive because of other factors salient to that medium (e.g. disinhibition on the Internet). Therefore, future research needs to distinguish between excessive play in different media.

There is also the question of developmental effects, i.e., does video game playing or social networking have the same effect regardless of age? It could well be the case that playing video games and social networking have a more pronounced addictive effect in young children but less of an effect (if any) once they have reached their adult years. There is also the social context of playing, i.e., does playing in groups or individually, with or against each other affect potential addictiveness of games in any way. These all need further empirical investigation.

It does appear that excessive entertainment technology use can have potentially damaging effects upon a minority of individuals who display compulsive and addictive behaviour, and who will do anything possible to 'feed their addiction.' Using these individuals in research would help identify the roots and causes of addictive playing and the impact of such behaviour on family and school life. It would be clinically useful to illustrate problem cases even following them longitudinally and recording developmental features of technological addictions. This would help determine the variables that are salient in the acquisition, development and maintenance of such behaviours.

There is no doubt that technology usage among the general population will continue to increase over the next few years and that if social pathologies (including video game addiction and social networking addiction) do exist then this is certainly an area for development that should be of interest and concern to all those involved in the addiction research field. Until there is an established body of literature on the psychological, sociological and physiological effects of technological addiction, directions for education, prevention, intervention and treatment will remain limited in scope.

The issues encountered by contemporary researchers and clinicians regarding the assessment of online addictions appear complex and include several factors. Firstly, it has been noted how historically the use of inconsistent heterogeneous and non-consensual nomenclatures to describe what appears to be the same phenomenon (i.e., gaming addiction) has influenced the development of a varied number of definitions and frameworks for understanding and assessing the disorder. Secondly, despite being important at some point, these definitions and frameworks largely contributed to the "boom" in the development of several psychometric tools for assessing gaming addiction irrespective of the their viability. Thirdly, as outlined by reviews on the assessment of most used psychometric tools, these tools have a wide range of problems.

Some of these conceptual problems found in the literature regarding the assessment of gaming addiction are important because without conceptual clarity and empirical support for treatment efficacy, it is also premature to offer clinical guidelines for the treatment of generalized internet addiction or gaming addiction. Furthermore, because some of the early conceptualizations where online gaming addiction was seen as a subtype of internet addiction, a trend for assessing online gaming addiction using generalized internet addiction tools have been established and translated by a substantial number of studies using this method. This in turn, has contributed to some of the methodological problems in the literature regarding the assessment and understanding of gaming addiction.

There is clearly a need to distinguish between addictions to the Internet and addictions on the Internet. As noted throughout this chapter, gambling addicts who chooses to engage in online gambling, as well as a computer game addicts who play online are not Internet addicts – the Internet is just the place where they conduct their chosen (addictive) behaviour. These people display addictions on the

Internet. However, there is also the observation that some behaviours engaged on the Internet (e.g., cybersex, cyberstalking, etc.) may be behaviours that the person would only carry out on the Internet because the medium is anonymous, non face-to-face, and disinhibiting (Griffiths, 2012).

In contrast, it is also acknowledged that there are some case studies that seem to report an addiction to the Internet itself (e.g., Young, 1998; Griffiths, 2000b). Most of these individuals use functions of the Internet that are not available in any other medium, such as chat rooms or various role playing games. These are people addicted <u>to</u> the Internet. However, despite these differences, there seem to be some common findings, most notably reports of the negative consequences of excessive technology use (neglect of work and social life, relationship breakdowns, loss of control, etc.), which are comparable to those experienced with other, more established addictions. Based on the empirical research to date, technological addictions (and thus addictions to entertainment) do exist. However, how prevalent they are remains highly debatable.

References

Alabi, O.F. (2012). A survey of Facebook addiction level among selected Nigerian university undergraduates. *New Media and Mass Communication, 10,* 70-80.

American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders - Text Revision (Fifth Edition).* Washington, D.C.: Author.

Andraessen, C.S., Tosheim, T., BrunBerg, G.S., & Pallesen, S. (2012) Development of a Facebook Addiction Scale. *Psychological Reports, 110,* 501-517.

Brand, M., Young, K.S., & Laier, C. (2014). Prefrontal control and Internet addiction: A theoretical model and review of neuropsychological and neuroimaging findings. *Frontiers in Human Neuroscience,* 8(375).

Brown, R. I .F. (1993). Some contributions of the study of gambling to the study of other addictions. In W.R. Eadington & J.A. Cornelius (Eds.), *Gambling Behavior and Problem Gambling* (pp. 241-272). Reno: University of Nevada Press.

Cabral, J. (2011). Is Generation Y Addicted to social media? *Elon Journal of Undergraduate Research in Communications*, *2*(1), 5-13.

Cam, E., & Isbulan, O. (2012). A new addiction for teacher candidates: Social networks. *Turkish Online Journal of Educational Technology, 11(3),* 14-19.

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

Cultrara, A., & Har-El, G. (2002). Hyperactivity-induced suprahyoid muscular hypertrophy secondary to excessive video game play: a case report. *Journal of Oral and Maxillofacial Surgery, 60,* 326–327.

Davis, R.A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior,* 17, 187-95.

Dworak, M., Schierl, T., Bruns, T., & Struder, H. K. (2007). Impact of singular excessive computer game and television exposure on sleep patterns and memory performance of school-aged children. *Pediatrics, 120*, 978–985.

Egli, E. A. & Meyers, L. S. (1984). The role of video game playing in adolescent life: Is there a reason to be concerned? *Bulletin of the Psychonomic Society, 22*, 309-312.

Elphinston, R. A., & Noller, P. (2011). Time to face it! Facebook Intrusion and the implications for romantic jealousy and relationship satisfaction. *Cyberpsychology, Behavior, and Social Networking, 14,* 631-635.

Gentile, D.A., Choo, H., Liau, A., Sim, T., Li, D., Fung, D., & Khoo, A. (2011). Pathological video game use among youths: A two-year longitudinal study. *Pediatrics, 127*, 319-329.

Griffiths, M. D. (1995). Technological addictions. *Clinical Psychology Forum*, *76*, 14-19.

Griffiths, M. D. (1998). Internet addiction: Does it really exist? In J. Gackenbach (Ed.), *Psychology and the Internet: Intrapersonal, Interpersonal and Transpersonal Applications* (pp. 61-75). New York: Academic Press.

Griffiths, M. D. (2000a). Internet Addiction – Time to be taken seriously? *Addiction Research, 8,* 413-418.

Griffiths, M. D. (2000b). Does internet and computer "addiction" exist? Some case study evidence. *CyberPsychology and Behavior, 3,* 211-18.

Griffiths, M. D. (2005). A "components" model of addiction within a biopsychosocial framework. *Journal of Substance Use*, *10,* 191-197.

Griffiths, M. D. (2010a). The role of context in online gaming excess and addiction: Some case study evidence. *International Journal of Mental Health and Addiction*, *8*, 119-125.

Griffiths, M. D. (2012a). Internet sex addiction: A review of empirical research. *Addiction Research and Theory, 20*, 111-124.

Griffiths, M. D. (2012b). Facebook addiction: Concerns, criticisms and recommendations. *Psychological Reports, 110,* 2, 518-520.

Griffiths, M. D. & Hunt, N. (1998). Dependence on computer games by adolescents. *Psychological Reports*, *82*, 475-480.

Griffiths, M. D., Kuss, D. J. & Demetrovics, Z. (2014). Social networking addiction: An overview of preliminary findings. In K. Rosenberg & L. Feder (Eds.), *Behavioral Addictions: Criteria, Evidence and Treatment* (pp.119-141). New York: Elsevier.

Griffiths, M. D., Kuss, D. J. & King, D. L. (2012). Video game addiction: Past, present and future. *Current Psychiatry Reviews, 8,* 308-318.

Griffiths M.D. & Szabo, A. (2014). Is excessive online usage a function of medium or activity? An empirical pilot study. *Journal of Behavioral Addictions,* 3, 74–77.

Grüsser, S. M., Thalemann, R. & Griffiths, M. D. (2007). Excessive computer game playing: Evidence for addiction and aggression? *CyberPsychology and Behavior, 10,* 290-292.

Han, D. H., Hwang, J. W., & Renshaw, P. F. (2010). Bupropion sustained release treatment decreases craving for video games and cue-induced brain activity in patients with Internet video game addiction. *Experimental and Clinical Psychopharmacology, 18,* 297–304.

Han, D. H., Lee, Y. S., Na, C., Ahn, J. Y., Chung, U. S., Daniels, M. A., et al. (2009). The effect of methylphenidate on Internet video game play in children with attention-deficit/hyperactivity disorder. *Comprehensive Psychiatry, 50,* 251–256.

Hoeft, F., Watson, C. L., Kesler, S. R., Bettinger, K. E., & Reiss, A. L. (2008). Gender differences in the mesocorticolimbic system during computer game-play. *Journal of Psychiatric Research, 42*, 253–258.

Hussain, Z., Griffiths, M. D. & Baguley, T. (2012). Online gaming addiction: classification, prediction and associated risk factors. *Addiction Research and Theory, 20,* 359-371.

Keepers, G. A. (1990). Pathologicical preoccupation with video games. *Journal of the American Academy of Child and Adolescent Psychiatry, 29,* 49-50.

King, D. L., Delfabbro, P. H. & Griffiths, M. D. (2012). Clinical interventions for technology-based problems: Excessive Internet and video game use. *Journal of Cognitive Psychotherapy: An International Quarterly, 26*, 43-56.

King, D. L., Haagsma, M. C., Delfabbro, P. H., Gradisar, M. S., Griffiths, M. D. (2013). Toward a consensus definition of pathological video-gaming: A systematic review of psychometric assessment tools. *Clinical Psychology Review, 33*, 331-342.

Kim, M.G., & Kim J, (2010) Cross-validation of reliability, convergent and discriminant validity for the problematic online game use scale. *Computers in Human Behavior,* 26, 389-398.

Király, O., Griffiths, M.D., Urbán, R., Farkas, J., Kökönyei, G. Elekes, Z., Domokos 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 and Social Networking,* 17, 749-754.

Ko, C. H., Liu, G. C., Hsiao, S. M., Yen, J. Y., Yang, M. J., Lin, W. C., et al. (2009). Brain activities associated with gaming urge of online gaming addiction. *Journal of Psychiatric Research, 43*, 739–747.

Koc, M., & Gulyagci, S. (2013). Facebook addiction among Turkish college students: The role of psychological health, demographic, and usage characteristics. *Cyberpsychology, Behavior, and Social Networking, 16*, 279-284.

Koronczai, B., Urban, R., Kokonyei, G., Paksi, B., Papp, K., Kun, B., Demetrovics, Z. (2011). Confirmation of the three-factor model of problematic internet use on off-line adolescent and adult samples. *Cyberpsychology, Behavior and Social Networking,* 14, 657–664.

Kuss, D. J. & Griffiths, M. D. (2011). Online social networking and addiction: A literature review of empirical research. *International Journal of Environmental and Public Health, 8*, 3528-3552.

Kuss, D. J. & Griffiths, M. D. (2012). Online gaming addiction: A systematic review. *International Journal of Mental Health and Addiction, 10*, 278-296.

Petry, N. M. & O'Brien, C. P. (2013). Internet gaming disorder and the DSM-5. *Addiction, 108,* 1186–1187.

Phillips, C. A., Rolls, S., Rouse, A. & Griffiths, M. D. (1995). Home video game playing in schoolchildren: A study of incidence and patterns of play. *Journal of Adolescence*, *18*, 687-691.

Porter, G., Starcevic, V., Berle, D., & Fenech, P. (2010). Recognizing problem video game use. *The Australian and New Zealand Journal of Psychiatry, 44,* 120–128.

Rehbein, F., Kleimann, M., & Mossle, T. (2010). Prevalence and risk factors of video game dependency in adolescence: results of a German nationwide survey. *CyberPsychology, Behavior and Social Networking, 13,* 269–277.

Shotton, M. (1989). *Computer addiction?: A study of computer dependency.* London: Taylor and Francis.

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

Thalemann, R., Wölfling, K., & Grüsser, S. M. (2007). Specific cue reactivity on computer game-related cues in excessive gamers. *Behavioral Neuroscience, 12,* 614–618.

Turel, O. & Serenko, A. (2012). The benefits and dangers of enjoyment with social networking websites. *European Journal of Information Systems, 21,* 512-528.

Xu, H. & Tan, B.C.Y. (2012). Why do I keep checking Facebook: Effects of message characteristics on the formation of social network services addiction (http://elibrary.aisnet.org/Default.aspx?url=http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1216&context=icis2012)

Young, K. (1998). *Caught in the Net: How to recognize the signs of Internet addiction and a winning strategy for recovery.* New York: Wiley.

Young K. (1999). Internet addiction: Evaluation and treatment. *Student British Medical Journal, 7*, 351-352.