Where do gambling and internet 'addictions' belong?
The status of 'other' addictions

Mark D. Griffiths[1], Daria J. Kuss, Halley M. Pontes and Joël Billieux

Corresponding author:
International Gaming Research Unit
Psychology Division
Nottingham Trent University
Burton Street
Nottingham
NG1 4BU
United Kingdom

Email:
mark.griffiths@ntu.ac.uk

Where do gambling and internet 'addictions' belong?
The status of 'other' addictions

Conceptualizing addiction has been a matter of great debate for many years. For many scholars, the concept of addiction involves taking of drugs (e.g., Walker, 1989). Therefore it is perhaps unsurprising that most dictionary definitions focus on drug ingestion. However, there is now a growing movement (e.g., Grant et al., 2010; Griffiths, 2005; MacLaren & Best, 2010; Orford, 2001; Shaffer et al., 2004; van Rooij et al., 2010) that views a number of behaviours as potentially addictive, including those that do not involve the ingestion of a drug. These include behaviours diverse as gambling (Griffiths, 2006), eating (Meule & Gearhardt, 2014), sex (Carnes et al., 2005), exercise (Berczik et al., 2014), videogame playing (Griffiths et al., 2012), Internet use (Kuss et al., 2014a), mobile phone use (Billieux et al., 2015), social networking (Griffiths et al., 2014), love (MacLaren & Best, 2010), shopping (Maraz, Eisinger et al., 2015), and work (Andreassen et al., 2014), as well as more controversial behaviours such as studying (Atroszko et al., 2015), and dancing (Maraz, Urban et al., 2015). Such diversity has led to all encompassing definitions of what constitutes an addictive behaviour. One such definition is that of Marlatt, Baer, Donovan and Kivlahan (1988), who defined addictive behaviour as:

"A repetitive habit pattern that increases the risk of disease and/or associated personal and social problems. Addictive behaviours are often experienced subjectively as 'loss of control' - the behaviour contrives to occur despite volitional attempts to abstain or moderate use. These habit patterns are typically characterized by immediate gratification (short term reward), often coupled with delayed deleterious effects (long term costs). Attempts to change an addictive behaviour (via treatment or self initiation) are typically marked with high relapse rates" (p. 224).

The way of determining whether behavioural (i.e. non-chemical) activities are addictive in a non-metaphorical sense is to compare them against clinical criteria for other established drug-ingested addictions (Griffiths, 2008). Historically, this method of making behavioural excesses more clinically identifiable has been proposed for behavioural addictions such as "television addiction" (McIlwraith, Jacobvitz, Kubey & Alexander, 1991), "amusement machine addiction" (Griffiths, 1991) and "pinball addiction" (Griffiths, 1992). Further to

this, authors such as Carnes (1991), Brown (1993) and Griffiths (2005) have postulated that addictions consist of a number of common components. Carnes (1991) outlined what he called the "signs of addiction" (see Table 1). To a large extent, these ten signs are subsumed within the components outlined by Brown (1993) and were later modified by Griffiths (1996; 2005). Griffiths' (2005) most recent components of addiction comprise salience, mood modification, tolerance, withdrawal, conflict and relapse. These are described in more detail below with some relevant examples.

INSERT TABLE 1 ABOUT HERE

Salience: This refers to when the particular activity becomes the most important activity in the person's life and dominates their thinking (preoccupations and cognitive distortions), feelings (cravings) and behaviour (deterioration of socialised behaviour). For instance, even if the person is not actually engaged in the behaviour they will be thinking about the next time they will be. It should also be noted that some addictive behaviours such as smoking (nicotine) and drinking (alcohol) are activities that can be engaged simultaneously with other activities and therefore these behaviours do not tend to dominate an addict's thoughts or lead to total preoccupation. For instance, a smoker can carry around their cigarettes and still engage in other day-to-day activities. However, if that person was in a situation that they were unable to smoke for a long period (such as a 24-hour plane flight), smoking would be the single most important thing in that person's life and would totally dominate their thoughts and behaviour. This is what Griffiths (2005) has termed "reverse salience" with the addictive activity becoming the most important thing in that person's life when they are prevented from engaging in the behaviour.

Mood modification: This refers to the subjective experience (often experienced positively) that people report as a consequence of engaging in the particular activity (i.e., they experience an arousing "buzz" or a "high" or paradoxically a tranquilizing and/or de-stressing feel of "escape" or "numbing"). What is interesting is that a person's drug or activity of choice can have the capacity to achieve different mood modifying effects at different times. For instance, a nicotine addict may use cigarettes first thing in the morning to get the arousing 'nicotine rush' they need to get going for the day. By the end of the day they may not be

using nicotine for its stimulant qualities, but may in fact be using nicotine as a way of de-stressing and relaxing. It could be argued that in these situations, psychology to some extent overrides physiology because of expectation effects. In essence, many addicts use substances and behaviours as a way of producing a reliable and consistent shift in their mood state as a coping strategy to "self-medicate" and make themselves feel better in the process.

Tolerance: This refers to the process whereby increasing amounts of the particular activity are required to achieve the former effects. The classic example of tolerance is a heroin addict's need to increase the size of their 'fix' to get the type of feeling (e.g., an intense 'rush') they once got from much smaller doses. In gambling, tolerance may involve the gambler gradually having to increase the size of the bet to experience a mood modifying effect that was initially obtained by a much smaller bet. It may also involve spending longer and longer periods gambling. Tolerance is well established in psychoactive substance addictions and there is growing evidence that it can occur in gambling and Internet gaming disorders. However, it is worth noting that there is currently a tendency to argue, based on studies relying on self-reports, that various potentially excessive behaviours (e.g., dancing, shopping) are marked by tolerance symptoms. However, it is not possible to assert any definitive conclusions regarding the existence of tolerance with regard to specific behaviours unless neurobiological evidence (e.g., alteration/sensitisation in specific cerebral circuitries) confirms it (Billieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015).

Withdrawal symptoms: These refer to the unpleasant feeling states and/or physical effects that occur when the particular activity is discontinued or suddenly reduced. Such withdrawal effects may be psychological (e.g., extreme moodiness and irritability) or more physiological (e.g., nausea, sweats, headaches, insomnia, and other stress-related reactions). Withdrawal effects are well documented in drug addictions (Orford, 2001) and there is growing evidence that behavioural addictions such as pathological gambling also feature withdrawal symptoms (Griffiths, 2004). For instance, Rosenthal and Lesieur (1992) found that at least 65% of pathological gamblers reported at least one physical side-effect during withdrawal including insomnia, headaches, upset stomach, loss of appetite, physical weakness, heart racing, muscle aches, breathing difficulty and/or chills. Similar findings were reported by Griffiths and Smeaton (2002). In the case of Internet Gaming Disorder (IGD), withdrawal symptoms may

be experienced when the activity of gaming is taken away (American Psychiatric Association [APA], 2013). In the particular case of IGD, these symptoms are typically described as irritability, anxiety, or sadness, but there are no physical signs of pharmacological withdrawal as in substance use disorders (APA, 2013).

Conflict: This refers to conflicts between the addict and those around them (interpersonal conflict) or from within the individual themselves (intrapsychic conflict) which are concerned with the particular activity. Continual choosing of short-term pleasure and relief leads to disregard of adverse consequences and long-term damage, which in turn increases the apparent need for the addictive activity as a coping strategy. The conflict in the addict's life means that they end up compromising their (i) personal relationships (e.g., partner, children, relatives, friends, etc.), (ii) working or educational lives (depending on what age they are), and (iii) other social and recreational activities. Intra-psychic conflict may also be experienced in the form of addicts knowing that they are engaged heavily in the behaviour and want to cut down or stop – but find they are unable to do so as they are experiencing a subjective loss of control that in turn might be facilitated due to the person's desire to intentionally avoid or mitigate potential withdrawal symptoms resulting from the discontinuation or reduction of the behaviour.

Relapse: This refers to the tendency for repeated reversions to earlier patterns of the particular activity to recur and for even the most extreme patterns typical of the height of the addiction to be quickly restored after many years of abstinence or control. The classic example of relapse behaviour is in smokers who often give up for a period of time only to return to full-time smoking after a few cigarettes. However, such relapses are common in all addictions including behavioural addictions, such as gambling (Griffiths, 2002).

Griffiths (2002) has argued that all these components need to be present for a behaviour to be operationally defined as addictive. It is clear that some individuals engage in behaviours that have addictive elements without it necessarily being a full-blown addiction. For instance, as Griffiths (2010) has argued, if someone has no negative withdrawal effects after stopping their excessive behaviour, are they really addicted? If the excessive behaviour does not conflict with anything else in that person's life, can it be said to be an addiction (Griffiths,

2010)? The difference for individuals between an excessive healthy enthusiasm and an addiction is that healthy enthusiasms have minimal adverse health and psychosocial consequences whereas addictions lead to major adverse health and psychosocial consequences.

Where does addiction reside? To paraphrase Burglass and Shaffer (1984), the important questions in the addiction field are 'why do people become addicted to some things and not others?' and 'why do some people become addicted and not others?' Answers to these questions have been hindered by two common misconceptions about addiction, which to some extent have underpinned the 'hard core' disease concept of addiction (Larkin, Wood & Griffiths, 2006). These are that addiction somehow resides within: (i) particular types of people or (ii) particular substances, and/or particular kinds of activity. That is, either some people are already 'diseased' (i.e., predisposed and/or more vulnerable and susceptible), or else some substances/activities cause this disease (and that some substances and behaviours may be more addictive than others), or both.

Does addiction reside in particular types of people? There is a belief that some people are destined to become addicted. Typically this is explained in one (or both) of two ways, i.e., that some people (i.e., 'addicts') have an addictive personality, and that there is a genetic basis for addiction. The evidence for 'addictive personality' rests to a certain extent upon one's belief in the validity of psychometric testing, given numerous sources of potential errors (i.e., sensitivity to data transformation, and the accuracy and consistency of the measures used in terms of validity and reliability) (Frankfort-Nachmias & Nachmias, 1996). Setting aside this major hurdle, the evidence for the existence of an addictive personality is still inconclusive and contradictory (Larkin et al., 2006). First, psychologists have yet to better understand which particular personality traits are linked to addiction. Studies have claimed that 'the addictive personality' may be characterised by a wide range of factors (e.g., sensation-seeking, impulsivity, extroversion, neuroticism locus-of-control preferences, emotion regulation strategies, major traumatic life events, learned behaviours, etc.). The extent of this range stretches not only the notion of an 'addictive personality' but also the concept of 'personality' itself (Larkin et al., 2006). However, addiction is far more complex than this (West, 2001). Of course, the relationship between individual bodies, minds, contexts, and life

histories is complex and important – but it requires that we approach the matter from a more sophisticated and integrative position (e.g., Orford, 2001; Shaffer et al., 2004; Griffiths, 2008).

The search for a genetic basis for addiction rests upon the notion that some types of individuals are somehow 'biologically wired' to become addicts. Larkin et al. (2006) argue that we must set aside any doubts about the limited conceptualisation of 'the environment' that often typifies this kind of research, and its combination with epidemiological designs that are largely descriptive (Kendler, 2005). Meta-analytic reviews (e.g., Walters, 2002; Tyndale, 2003) have concluded that the heritability of addictive behaviours is likely to be controlled by many genes, each contributing a small fraction to the overall risk. Furthermore, a number of these same genes appear to be risk factors for other problems, and some of them are conceptually unrelated to addiction. Larkin et al. (2006) argue that the main point here is that while these findings do contribute something to our understanding of 'why some people become addicted and not others', they do not adequately or independently explain the range of variation. Therefore, the most we can say is that some people are more likely to develop problems under certain conditions, and that, given the right conditions, most people could probably develop an addiction. Emphasis needs to be placed on identifying those 'conditions', rather than on searching for the narrowest of reductionist explanations.

Does addiction reside in particular types of substance or activity? Larkin et al. (2006) argue that substances and activities cannot be described as intrinsically addictive in themselves (unless one chooses to define 'addictive' in terms of a substance or behaviour's ability to produce tolerance and/or withdrawal, and to ignore the range of human experience that is excluded by this). Biologists may be able to tell us very valuable things about the psychopharmacological nature of the rewards that particular substances and behaviours provide, and the different kinds of neuroadaptation that they may or may not produce in order to cause tolerance and/or withdrawal. But neuroadaptation on its own as Larkin et al. (2006) argue is not an adequate explanation for addiction. Robins, Helzer and Davis' (1975) classic study of heroin-users returning from the Vietnam war is one example of the evidence that refutes this oversimplification. This study clearly highlighted the importance of context (i.e., that in a war zone environment individuals were addicted to heroin but on return to

civilian life the addiction ceased to exist), and the framework provided by such contexts for making sense of addiction. In a hostile and threatening environment, opiates clearly provided something not usually required by most people; and given a cultural environment in which opiate use is commonplace, and where opiates are available, then opiate use 'makes sense'. This study provides support for the assertion that some people are more likely to become addicted under some conditions, and that given the right conditions perhaps many people could understand what it means to be an addict.

The question 'why some individuals/addictions and not others?' necessitates an evaluation of the rewards associated with the particular activity/substance. These rewards may be qualitatively very different, and may not necessarily be inherent or unique to a particular activity or substance. Many rewarding activities are rewarding because they present individuals with opportunities to 'shift' their own subjective experience of themselves (for example, see Larkin and Griffiths' [2004] research on Ecstasy use and bungee jumping). Frequently, a range of such opportunities is offered to the experienced user. Shaffer (1996) has pointed out that those activities that can be most relied upon to shift self-experience in a robust manner are likely to be the most popular – and (as a consequence) to be the most frequent basis of problems. Therefore, our understanding of the available resources for mood modification must play a major part in understanding addiction. However, one must make a careful distinction between describing some substances as being more 'robust shifters of experience' than others (as Larkin et al. [2006] would advocate) and describing some substances as 'more addictive' than others (which Larkin et al. would not). However, more neuroscience-based accounts suggest the involvement of particular brain regions in facilitating and inhibiting addiction that has implications for the propensity of a substance or behaviour to produce addiction and the propensity of an individual to become addicted (Goodman, 2008).

The 'new' behavioural addictions

As noted at the beginning of this chapter, there are many behaviours that when taken to excess have been described as bona fide addictions. The remainder of this chapter briefly reviews the literature relating to three 'new' behavioural addictions (i.e., gambling addiction, video game addiction and Internet addiction) as these three behaviours have received more

empirical research than other behavioural addictions (e.g., work addiction, exercise addiction, sex addiction, etc.).

An increasing number of research studies over the last three decades suggest that a wide range of chemical (i.e., substance) and behavioural (i.e., process) addictions may serve similar functions. While often previously associated with physiological tolerance and withdrawal effects, the term 'addiction' has achieved a broader definition (Brewer & Potenza, 2008; Griffiths, 2005; Marks, 1990; Orford, 2001; Schneider & Irons, 2001). Among many researchers and clinicians, 'addiction' has come to refer to a disorder in which an individual becomes intensely preoccupied with a behaviour that at first provides a desired or appetitive effect but eventually the long-term disadvantages outweigh the short-term benefits.

Both chemical and behavioural addictions are often associated with subjective reports of arousal, pleasure, or fantasy (e.g., Brewer & Potenza, 2008; Johansson et al., 2009; Schneider & Irons, 2001; Volkow & Wise, 2005). Furthermore, the addictive behaviour occurs with several pattern variations (e.g., bingeing, or sustained preoccupation), but always repeatedly, involving a great deal of time thinking about and engaging in the behaviour (Brewer & Potenza, 2008; Griffiths, 2005; Marks, 1990). An addiction disorder also typically involves loss of ability to choose freely whether to stop or continue the behaviour (loss of control), and leads to experiencing behaviour-related adverse consequences (Schneider & Irons, 2001). In other words, the person becomes unable to reliably predict when the behaviour will occur, how long it will go on, when it will stop, or what other behaviours may become associated with the addictive behaviour. As a consequence, other activities are given up or, if continued, are no longer experienced as being as enjoyable as they once were. Further negative consequences of the addictive behaviour may include interference with performance of life roles (e.g., job, social activities, or hobbies), impairment of social relationships, criminal activity and legal problems, involvement in dangerous situations, physical injury and impairment, financial loss, or emotional trauma (Sussman et al., 2011).

While many drug and non-drug addictions do not appear to produce obvious physical dependence (i.e., physiological-based tolerance and withdrawal effects), they do create a subjective need for increased involvement in the behaviour to achieve satiation, and abrupt

termination of the behaviour often leads to such symptoms as depression, intense anxiety, hopelessness, helplessness and irritability. The addictive behaviour may seem to the addict 'as if' it is the best solution to resolve these negative symptoms (Sussman & Unger, 2004). Regardless of the level of physical dependence, relapse rates across various addictions appear to be relatively high (Sussman et al, 2011).

Gambling addiction

Gambling is a diverse concept that incorporates a range of activities undertaken in a variety of settings. Predominantly, gambling has an economic meaning and usually refers to risking (or wagering) money or something of value on the outcome of a game, contest, or other event in the hope of winning additional money or material goods. The activity varies on several dimensions, including what is being wagered, how much is being wagered, the expected outcome, and the predictability of the event. For some things such as lotteries, most slot machines and bingo, the results are random and unpredictable. For other activities, such as sports betting and horse racing, there is some predictability to the outcome and the use of skills and knowledge (e.g., recent results of the team or horse being bet upon, environmental factors, etc.) can give a person an advantage over other gamblers.

In many areas of the world gambling has become a popular activity. Almost all national surveys into gambling have concluded that most people have gambled at some point in their lives, and there are more gamblers than non-gamblers, but that most participants gamble infrequently (Meyer et al., 2009). The introduction of national lotteries, the proliferation of slot machines, the expansion of casinos, and the introduction of new media in which to gamble (e.g., Internet gambling, mobile phone gambling, interactive television gambling, gambling via social networking sites), has greatly increased the accessibility and popularity of gambling worldwide, and as a result, the number of people seeking assistance for gambling-related problems (Griffiths, 2014a). Commissions and official government reviews in a number of countries including the United States, United Kingdom, Australia and New Zealand have all concluded that increased gambling availability has led to an increase in problem gambling (Griffiths, 2014a).

The term 'problem gambling' has been used by many researchers, bodies, and organisations, to describe gambling that compromises, disrupts or damages family, employment, personal or recreational pursuits (Griffiths, 2004). There is some disagreement in the literature as to the terminology used, as well as the most appropriate screens to diagnose and measure the phenomenon. Researchers internationally are beginning to reach a consensus over a view of problem gambling that moves away from earlier, often heavily DSM-based clinical (i.e., medical) definitions. For instance, early conceptions of 'pathological gambling' were of a discrete 'disease entity' comprising a chronic, progressive mental illness, which only complete abstinence could hope to manage. The latest fifth edition of the DSM (APA, 2013) has furthermore reviewed the previous categorisation of pathological gambling within the spectrum of Impulse-Control Disorders, and classified it as first and only officially recognised behavioural addiction, alongside renaming the condition 'Gambling Disorder'. These changes have come about following a plethora of research evidencing neurobiological and neurochemical similarities between substance-related addictions and gambling (Betz et al., 2000; Breiter et al., 2001; Potenza, 2001).

More recent thinking regards problem gambling as a behaviour that exists on a continuum, with extreme, pathological presentation at one end, very minor problems at the other, and a range of more or less disruptive behaviours in between. Moreover, this behaviour is something that is mutable. Research suggests it can change over time as individuals move in and out of a problematic status and the behaviour is often subject to natural remission (Meyer, Hayer & Griffiths, 2009). Put more simply, gamblers can often move back to non-problematic recreational playing after spells of even quite serious problems. This conception fits in with an emphasis on more general public health, with a focus on the social, personal and physical 'harms' that gambling problems can create among various sectors of the population, rather than a more narrow focus on the psychological and/or psychiatric problems of a minority of 'pathological' individuals. Such a focus tends also to widen the net to encompass a range of problematic behaviours that can affect much larger sections of the population.

There is a multitude of terms used to refer to individuals who experience difficulties related to their gambling. These reflect the differing aims and emphases among various stakeholders

concerned with treating patients, studying the phenomenon, and influencing public policy in relation to gambling legislation. Besides 'problem' gambling, terms include (but are not limited to) 'pathological', 'addictive', 'excessive', 'dependent', 'compulsive', 'impulsive', 'disordered', and 'at-risk' (Griffiths, 2007). Terms are also employed to reflect more precisely the differing severities of addiction. For example, 'moderate' can refer to a lesser level of problem, and 'serious problem gambling' to the more severe end of the spectrum. Although there is no absolute agreement, commonly 'problem gambling' is used as a general term to indicate all of the patterns of disruptive or damaging gambling behaviour.

It should also be noted that problem gambling does not occur in a vacuum and that it is often co-morbid with other behavioural and psychological disorders, which can exacerbate, or be exacerbated by, problem gambling. Some of the psychological difficulties a problem gambler may experience include anxiety, depression, guilt, suicidal ideation and actual suicide attempts (Griffiths, 2004). Problem gamblers may also suffer irrational distortions in their thinking (e.g., denial, superstitions, overconfidence, or a sense of power or control) (Griffiths, 1994). For example, it has been shown that gamblers characterised by irrational gambling-related cognitions (e.g., illusion of control, predictive bias) present persistent playing in experimental gambling tasks using real monetary reinforcement (Billieux, Van der Linden, Khazaal, Zullino, & Clark, 2012). Increased rates of attention-deficit hyperactivity disorder (ADHD), impulsive traits, substance abuse or dependence, antisocial, narcissistic, and borderline personality disorders have also been reported in pathological gamblers (Billieux et al., 2012; Blaszczynski, Steel, & McConaghy, 1997; Sussman, Lisha & Griffiths, 2011). Research indicates there is frequently a link with alcohol or drugs as a way of coping with anxiety or depression caused by gambling problems, and, conversely, alcohol may trigger the desire to gamble (Griffiths, Parke & Wood, 2002). There is also some evidence that co-morbidities may differ among demographic subgroups and gambling types (including gambling online [Kuss & Griffiths, 2012]). Taken as a whole, this suggests that problem gambling does not occur in a vacuum and that it might be symptomatic of a more global disturbance in biopsychosocial functioning of individuals that have gambling problems.

It has been pointed out that very few people are genuinely addicted to playing weekly or bi-weekly Lotto games (Griffiths & Wood, 2001). Some people may counter such an assertion

by pointing out they know people who spend far too much money on buying Lotto tickets and that it is a real problem in their life. Buying too many Lotto tickets can be problematic if the person buying them simply cannot afford it. Gambling behaviour should not be classified as addictive based on its frequency, amount or quantity but on whether the excess negatively impacts on other areas of the gambler's life. However, the resulting behaviour is 'problem gambling', not 'gambling addiction'. These two terms are not inter-changeable. Consequently, all gambling addicts are problem gamblers but not all problem gamblers are gambling addicts (Griffiths, 2014b).

Although many people may still use the terms 'problem gambling' and 'gambling addiction' interchangeably (Griffiths, 2016), there is a need to think of these terms as lying along a continuum in which 'gambling addiction' is at the extreme end of the scale and 'problem gambling' (while still of major concern) does not necessarily lead to problems in every area of a person's life. Many problem gamblers (for instance, as operationally defined by DSM-IV as endorsing three items on the pathological gambling criteria) do not display all the 'classic' indicators of genuine addictions (e.g., withdrawal symptoms, tolerance, relapse, salience, conflict, mood modification; Griffiths, 2005).

Estimates of the number of problem gamblers vary from country to country, but most countries that have carried out national prevalence surveys suggest that around 0.5% to 2% of individuals have a gambling problem (Griffiths, 2014b). These surveys also indicate that problem gambling is at least twice as common among males in comparison to females, and that those with poor education are more likely to be problem gamblers.

INSERT TABLE 2 ABOUT HERE

Addictions always result from an interaction and interplay between many factors including the person's biological and/or genetic predisposition, their psychological constitution (e.g. personality factors, unconscious motivations, attitudes, expectations and beliefs, etc.), their social environment (i.e., situational characteristics) and the nature of the activity itself (i.e., structural characteristics) (Parke & Griffiths, 2007). This 'global' view of addiction highlights the interconnected processes and integration between individual differences (i.e., personal

vulnerability factors), situational characteristics, structural characteristics, and the resulting addictive behaviour. Each of these general sets of influences (i.e., individual, structural and situational) can be subdivided much further, depending on the type of addiction.

There are many individual (i.e., personal vulnerability) factors that may be involved in the acquisition, development and maintenance of addiction (e.g., personality traits, biological processes, unconscious motivations, learning and conditioning effects, thoughts, beliefs and attitudes), although some factors are more idiosyncratic (e.g., financial motivation, economic pressures) in the case of gambling addiction.

On a situational level, there are many factors that are likely to be involved in acquisition elements of addictive behaviour. This is what some researchers have referred to as "object exposure" (i.e., Shaffer et al., 2004). Other factors central to understanding gambling behaviour are the situational characteristics of gambling activities. These are the factors that often facilitate and encourage people to gamble in the first place (Griffiths & Parke, 2003). Situational characteristics are primarily features of the environment (e.g., accessibility factors, such as location of the gambling venue, the number of venues in a specified area and possible membership requirements), but can also include internal features of the venue itself (décor, heating, lighting, colour, background music, floor layout, refreshment facilities), or facilitating factors that may influence gambling in the first place (e.g., advertising, free travel to and/or accommodation in the gambling venue, free bets or gambles on particular games) or influence continued gambling (e.g., the placing of a cash dispenser on the casino floor, free food and/or alcoholic drinks while gambling) (Griffiths & Parke, 2003; Griffiths, 2009).

In gambling, structural characteristics can be important in the development of addictive behaviour. Slot machines are known to be one of the most addictive types of gambling (Parke & Griffiths, 2006; Meyer, Hayer & Griffiths, 2009). Almost all of these structural factors (discussed below) are unique to slot machines and represent the features that are specifically incorporated into the machine by the designers and operators in the gaming industry to facilitate continuation of gambling behaviour once it has started. They are important in the development and maintenance of gambling addiction. This is what some researchers have referred to as either "object interaction" (i.e., Shaffer et al., 2004) or

"psycho-structural interaction" (Griffiths, 1993b). In online gambling, the structural and situational characteristics of the Internet may furthermore contribute to problem gambling, as online anonymity, accessibility and affordability may facilitate the initiation and maintenance of problem gambling (Kuss & Griffiths, 2012a).

Griffiths (1999) has noted that there is no precise frequency level of a gambling game at which people become addicted, since addiction will be an integrated mix of factors in which frequency is just one factor in the overall equation. Other factors and dimensions (external to the person themselves) which have been reported in the general gambling literature, and which were summarised by Griffiths (1999; Parke & Griffiths, 2007) include:

- Stake size (including issues around affordability, perceived value for money)
- Event frequency (i.e., the time gap between each gamble)
- Amount of money lost in a given time period (important in chasing losses)
- Prize structures (i.e., number and value of prizes)
- Probability of winning (e.g., 1 in 14 million on the lottery)
- Size of jackpot prize (e.g., over £1 million on the lottery)
- Skill and pseudo-skill elements (actual or perceived)
- "Near miss" opportunities (i.e., number of near winning situations)
- Light and colour effects (e.g. use of red lights on slot machines)
- Sound effects (e.g., use of buzzers or musical tunes to indicate winning)
- Social or asocial nature of the game (i.e., individual and/or group activity)
- Accessibility (e.g., opening times, membership rules)
- Accessibility (e.g., number of outlets)
- Location of gambling establishment (e.g., out of town, next to workplace)
- Type of gambling establishment (e.g., betting shop, amusement arcade)
- Advertising (e.g., television commercials)
- Rules of the game (e.g., easy or difficult to play)

Each of these factors may have implications for the gambler's motivations and as a consequence the social impact of gambling. It is for this reason, above all others, that a structural approach could be potentially useful. For drug addictions, structural characteristics

would include things such as the dose amount, the drug's toxicity, and the route of administration.

It is clear that by including the situational and structural characteristics of the addictive process, the aetiology of how and why addiction occurs starts to become very complex. Shaffer et al. (2004) argue that evidence supporting a broader conceptualisation of addiction is emerging. Citing neurobiological research, they claim that addiction disorders may not be independent. Put simply, they suggest that each addiction – whether it be to gambling, drugs, sex, or the Internet – might be a distinctive expression of the same underlying syndrome (i.e., addiction is a syndrome with multiple opportunistic expressions). To support their observations, Shaffer et al. report that many commonalities occur across different expressions of addiction, and that these commonalities reflect a shared aetiology.

In May 2013, the new criteria for problem gambling (i.e., 'Gambling Disorder' – see Table 2) were published in the fifth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-5), and for the very first time, problem gambling was included in the section 'Substance-related and Addiction Disorders' (rather than in the section on impulse control disorders). Although most of us in the field had been conceptualizing extreme problem gambling as an addiction for many years, this was arguably the first time that an established medical body had described it as such. The decision to conceptualise Gambling Disorder as a behavioural addiction has major implications for the field of behavioural addictions more generally as the inclusion of gambling as an addiction means that addictions do not have to involve the ingestion of a psychoactive substance and potentially 'opens the floodgates' for any excessive problematic behaviour to be conceptualised as an addiction. Two such addictions – videogame addiction and Internet addiction – are briefly overviewed in the next two sections.

Videogame addiction

Videogame addiction has become a topic of increasing research interest. Over the last decade there has been a significant increase in the number of empirical studies examining various aspects of video game addiction compared to the preceding decade (Douglas et al., 2008; Kuss et al., 2014). It should also be noted that given the lack of consensus as to

whether video game addiction exists and/or whether the term 'addiction' is the most appropriate to use, some researchers have instead used terminology such as 'excessive' or 'problematic' to denote the harmful use of video games (Yellowlees & Marks, 2007). Terminology for what appears to be for the same disorder and/or its consequences includes problem video game playing (King, Delfabbro & Zajac, 2011; Salguero & Moran, 2002), problematic online game use (Kim & Kim, 2010), video game addiction (Griffiths & Davies, 2005; Skoric, Teo & Neo, 2009), online gaming addiction (Charlton & Danforth 2007), Internet gaming addiction (Kuss & Griffiths, 2012), and Internet gaming disorder (APA, 2013).

Although there were reports of adolescent videogame addiction among males dating back to the 1980s and 1990s (e.g., Fisher, 1994; Griffiths, 1997; Griffiths & Hunt, 1998; Keepers, 1990; Kuczmierczyk, Walley & Calhoun, 1987; Phillips, Rolls, Rouse & Griffiths, 1995; Shotton, 1989; Soper & Miller, 1983), most research into videogame addiction has been published over the last decade. The substantial growth in the number of studies on video game addiction occurred as gaming expanded into the new online medium where games could be played in a persistent online world and as part of a gaming community (i.e., massively multiplayer online role playing games [MMORPGs] such as *World of Warcraft* and *Everquest*). Approximately sixty studies were published on gaming addiction between 2000 and 2010 (Kuss & Griffiths, 2012) and a vast majority of these examined MMORPG addiction across heterogeneous group ages (i.e., not only adolescence) in both genders.

At present, it is quite difficult to estimate the prevalence of problematic online gaming due to the lack of a clear definition, the application of measures without proper psychometric characteristics and studies using different samples, different research methodologies, and different cut-off points for classification (Dowling, 2014; Pontes & Griffiths, 2015). Large sample studies generally report prevalence values below 10%. A recent meta-analysis conducted by Ferguson, Coulson and Barnett (2011) that reviewed a relatively large amount of published empirical studies and doctoral dissertations, found an overall prevalence rate of problematic gaming around 3.1% among youth and young adults. However, Ferguson et al. note that these figures should be interpreted with caution as there is a lack of uniformity and guidance for researchers investigating the phenomenon of pathological gaming. Moreover, a

study conducted in the US on a national representative sample of teenagers (Gentile, 2009), as well as a large sample of Singaporean children (Gentile et al., 2011) both reported a problematic game use of approximately 9%. Results of another representative study in Germany showed that 3% of the male and 0.3% of the female participants were diagnosed as dependent on using video games, while another 4.7% of male and 0.5% of females were at risk of becoming dependent (Rehbein et al., 2010). In a large Hungarian online gamer sample, 3.4% of gamers belonged to the high-risk group of problematic gaming and another 15.2% to the medium-risk group (Demetrovics et al., 2012). A proportion of 4.6% of Hungarian adolescents (approx. 16 years old) belonging to a national sample were classified as high-risk users (Pápay et al., 2013).

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 (King et al., 2012) and the finding that this group is more at risk may be a consequence of sampling bias and the fact that this group plays video games more frequently than other socio-demographic groups. It has also been suggested that university students may be 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 et al., 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. Various reviews (e.g., Griffiths & Kuss, 2015) have shown that problematic gamers can suffer a wide range of negative consequences: (i) sacrificing work, education, hobbies, socializing, time with partner/family, and sleep, (ii) increased stress, (iii) an absence of real life relationships, (iv) lower psychosocial well-being and loneliness, (v) poorer social skills, (vi) decreased academic achievement, (vii) increased inattention, (viii) aggressive/oppositional behaviour and hostility, (ix) maladaptive coping, (x) decreases in verbal memory performance, (xi) maladaptive cognitions, and (xii) suicidal ideation.

The same reviews have also noted that in addition to the reported negative psychosocial consequences, there are also many reported health and medical consequences that may result of excessive video game playing. These include: (i) epileptic seizures, (ii) auditory hallucinations, (iii) visual hallucinations, (iv) enuresis, (v) encopresis, (vi) obesity, (vi) wrist pain, (vii) neck pain, (viii) elbow pain, (ix) tenosynovitis – also called "nintendinitis", (x) blisters, calluses, sore tendons, and numbness of fingers, (xi) hand-arm vibration syndrome, (xii) sleep abnormalities, (xiii) psychosomatic challenges, and (xiv) repetitive strain injuries. Research has also shown gaming addiction to be associated with a variety of comorbid disorders. This includes attention deficit hyperactivity disorder (Allison et al., 2006; Batthyány et al., 2009; Chan & Rabinowitz, 2006; Han et al., 2009), symptoms of generalised anxiety disorder, panic disorder, depression, social phobia (Allison et al., 2006), school phobia (Batthyány et al., 2009), and various psychosomatic symptoms (Batthyány et al., 2009). Taken together, this relatively long list of potential psychosocial and medical negative consequences along with various comorbidities clearly indicates that excessive gaming is a health concern irrespective of whether it is an addiction.

Prior to the publication of the latest DSM-5 (American Psychiatric Association, 2013), there had been some debate as to whether 'Internet addiction' should be introduced into the text as a separate disorder (Block, 2008; Petry & O'Brien, 2013). Alongside this, there was debate as to whether those researching in the online addiction field should be researching generalised Internet use and/or the potentially addictive activities that can be engaged on the Internet (e.g., gambling, video gaming, sex, shopping) (Griffiths, 2000; Griffiths, King & Demetrovics, 2014). Following these debates, the Substance Use Disorder Work Group (SUDWG) recommended that the DSM-5 include a sub-type of problematic Internet use (i.e., Internet gaming disorder [IGD]) in Section 3 ('Emerging Measures and Models') as an area that needed further research before being included in future editions of the DSM (Petry & O'Brien, 2013). According to Petry and O'Brien (2013), IGD will not be included as a separate mental disorder 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) aetiology 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 (Griffiths et al., 2014). A review of instruments assessing problematic, pathological and/or addictive gaming by King and colleagues (2013) reported that (up to the point of their review) 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 standardised 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 no inclusion of 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 (King et al., 2013; Petry & O'Brien, 2013). 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 than those used in epidemiological, experimental and neurobiological research settings (King et al., 2013; Koronczai et al., 2011).

A recent review by Pápay and colleagues (2014) argued that some researchers consider video games as the starting point for examining the characteristics of this specific disorder, while others consider the Internet as the main platform that unites different addictive Internet activities, including online games. Recent studies (Demetrovics et al., 2012; Kim & Kim, 2010) have made an effort to integrate both approaches. Consequently, 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 (Griffiths et al., 2014).

Griffiths (2005) has 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 aetiology of addictive behaviour. Consequently, online gaming addiction is viewed as a specific type of video game addiction. Similarly, Porter and colleagues (2010) do not differentiate between problematic video game use and problematic online game use. They conceptualise problematic video game use as excessive use of one or more video games resulting in a preoccupation and a loss of control over playing video games, and various negative psychosocial and/or physical consequences. However, unlike Griffiths (2005), their criteria for problematic video game use do not include other features usually associated with dependence or addiction (e.g., tolerance, physical symptoms of withdrawal), as they say there is no clear evidence that problematic gaming is associated with such phenomena. Researchers such as Young (1998) view online gaming addiction as a sub-type of Internet addiction and suggest that the Internet itself provides situation-specific characteristics that facilitate gaming becoming problematic and/or addictive. Irrespective of this, there is now a growing number of emerging studies suggesting that IGD may not be the same as "generalised" Internet addiction (Griffiths & Pontes, 2014; Király et al., 2014; Montag et al., 2014).

Kim and Kim's (2010) Problematic Online Game Use (POGU) model takes a more integrative approach and claims that neither of the approaches outlined above adequately captures the unique features of online games, such as MMORPGs. They argue that the Internet is just one channel through which people may access the content they want (e.g., gambling, shopping) and that such users may become addicted to the particular content rather than the channel itself. This is analogous to the argument by Griffiths (2000) that there is a fundamental difference between addictions *to* the Internet, and addictions *on* the Internet. However MMORPGs differ from traditional stand-alone video games as they include social and/or role-playing dimensions that allow interaction with other gamers in large and never-ending games (Kuss, Louws, & Wiers, 2012).

The POGU model resulted in five underlying dimensions of addictive gameplay (i.e., euphoria, health problems, conflict, failure of self-control, and preference of virtual relationship). Demetrovics and colleagues (2012) also support the integrative approach and stress the need to include all types of online games in addiction models in order to make

comparisons between genres and gamer populations possible (such as those who play online Real-Time Strategy (RTS) games and online First Person Shooter (FPS) games in addition to the widely researched MMORPGs. Their model comprises six dimensions (i.e., preoccupation, overuse, immersion, social isolation, interpersonal conflicts, and withdrawal).

Irrespective of approach or model, the components and dimensions that comprise online gaming addiction outlined above are very similar to the IGD criteria in Section 3 of the DSM-5. For instance, Griffiths' (2005) six addiction components directly map onto the nine proposed criteria for IGD (of which five or more need to be endorsed and result in clinically significant impairment) as shown by recent empirical studies (Pontes, Király, Demetrovics & Griffiths, 2014). 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 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].

Clearly, there exist a number of gaps in the current understanding of problematic video game play and gaming addiction. King et al. (2013) note there is a need for epidemiological research to determine the incidence and prevalence of clinically significant problems associated with video game play in the broader population. There are too few clinical studies that describe the unique features and symptoms of problematic video game play and/or video game addiction (Pontes & Griffiths, 2014). Most of the studies tend to examine problematic video play from the perspective of the individual. However, there is a small body of research suggesting that the characteristics of the video games themselves may have a role in the acquisition, development and maintenance of video game addiction. These studies have investigated the role of structural characteristics of video games in maintaining problem playing behaviour (Wood, Griffiths, Chappell & Davies, 2004; Westwood & Griffiths, 2010; King et al, 2011), but there is little empirical research that examines why

some individuals may be protected from developing excessive playing habits, or simply mature out of their problem playing behaviour. In addition to this, research on gaming addiction has not adequately assessed the context of gaming, including the individual, the gaming, and the cultural context (Kuss, 2013). Recent studies have also shown the importance of the various motives that underlain video game involvement (e.g., achievement, immersion, social affiliation, escapism, etc.) and which can act both as protective or risk factors (Yee, 2006; Billieux et al., 2013; 2015). Such omissions stand in the way of fully comprehending gaming addiction, the individual's and society's perceptions of and meanings associated with gaming behaviours and their consequences.

Internet addiction

Given the ubiquity of the Internet, Internet Addiction (IA) has become an increasingly researched topic (Kuss et al., 2014a). However, there are many debates as to whether IA exists at all (Pontes et al., 2015). Generally speaking, IA has been characterised by excessive or poorly controlled preoccupation, urges, and/or behaviours regarding Internet use that lead to impairment or distress in several life domains (Weinstein et al., 2014). However, according to Young et al. (1999), IA is a problematic behaviour akin to pathological gambling that can be operationally defined as an impulse-control disorder not involving the ingestion of psychoactive intoxicants. Young (1999) claimed IA comprised five different subtypes: (i) 'cyber-sexual addiction', (ii) 'cyber-relationship addiction', (iii) 'net compulsions' (i.e., obsessive online gambling, shopping, or trading), (iv) 'information overload', and (v) 'computer addiction' (i.e., obsessive computer game playing). However, Griffiths (2000) argued that when it comes to IA, most of the individuals who experience problems as a consequence of their Internet use have addictions *on* the Internet rather than *to* the Internet). In short, the Internet may be simply a medium to fuel other addictions (Griffiths & Szabo, 2014). Interestingly, new evidence pointing towards the need to make this distinction has been provided from studies in the online gaming field where robust empirical evidence has demonstrated that IA is not the same as other more specific addictive behaviours carried out online, such as online gaming addiction (Király et al., 2014), further magnifying the meaningfulness to differentiate between what may be called 'generalised' and 'specific' forms of online addictive behaviours, and also between IA and gaming addiction as these behaviours are conceptually different (Griffiths & Pontes, 2014).

Research suggests that Griffiths' (2005) addiction components model can be applied to IA across different age groups and different cultures (Kuss et al., 2014b, 2014c). According to this research, IA is operationally defined as a behavioural addiction akin to substance-related addictions, and is characterised by salience, mood modification, tolerance, withdrawal, conflict and relapse. Additionally, the IA components model conceptualises IA parsimoniously and comprehensively as shown by the good fit obtained with psychometric data collected from two large independent groups of participants (3,105 adolescents in the Netherlands and 2,257 university students in the UK) using two separate IA psychometric instruments (Kuss et al., 2014b). Moreover, the construct validity of IA was established via a nomological network (Cronbach & Meehl, 1955), linking constructs (i.e., IA and personality traits) and observations (i.e., empirical data collected from the above mentioned samples) to each other (Kuss et al., 2014c). Taken together, this research suggests the IA components model can function as an economic screener for clients in clinical settings, helping distinguish vulnerable individuals by means of their personality traits, and serving as a tool for purposive prevention.

Despite the fact that initial conceptualisations of IA have helped advance the current knowledge and understanding of this phenomenon, it has become evident that the field has greatly evolved. Research that attempts to estimate the IA prevalence rate is usually faced with several methodological shortcomings. For instance, there are currently no consensual criteria of IA, which directly impacts on the adequacy, reliability, and validity of studies using inconsistent diagnostic instruments to assess this phenomenon (Kuss et al., 2014; Pontes, Kuss & Griffiths, 2015; Weinstein et al., 2010). Furthermore, most studies reporting prevalence rates of IA usually suffer from sampling selection biases due to systematic use of non-probability sampling techniques (e.g., convenience samples) and over-reliance on specific samples (e.g., adolescents or adults) (Pontes et al., 2015). Consequently, these issues severely compromise the validity of most prevalence studies whilst also limiting possible comparisons of prevalence rates across different cultural contexts.

A recent review by Pontes et al. (2015) examined 12 large-scale epidemiological studies with nationally representative samples. The prevalence rates of IA ranged from a minimum of 1%

in one German study (i.e., Rumpf et al., 2014) to a maximum of 18.7% in a Taiwanese study (i.e., Lin et al., 2014). While all studies used cross-sectional designs to assess prevalence rates in different countries, significant heterogeneity in the assessment of IA was found alongside some arbitrariness in terms of the cut-off points adopted to ascertain prevalence rates, even when researchers had used the same instrument. Pontes et al. (2015) also noted that five of the 12 studies did not assess IA with a psychometrically validated instrument. Additionally, with the exception of one study (i.e., Rumpf et al., 2014), all remaining studies provided data on adolescent samples only, thus hampering the degree of generalisability of extant prevalence rates to other important segments of the general population, such as young children and adults.

Additional information on IA prevalence rates was provided in another recent review of studies. Cheng and Li (2014) conducted a meta-analysis in order to estimate prevalence rates of IA across several countries by searching for evidence stemming from empirical studies published between 1996 and 2012. In the study, the authors identified 164 IA prevalence rates published across 80 studies from 31 nations across seven world regions. The results showed a global prevalence of IA around 6%, with the highest rates found in the Middle East (10.9%) and lower rates found in Northern and Western Europe (2.6%). The authors also reported that poor quality of life was associated with greater prevalence rates of IA. Although this study was the first to systematically address the issue of IA prevalence worldwide, several limitations were present (such as consensual conceptualisation, assessment limitations, self-selected sampling, etc.). However, based on the findings, IA appears to exist, but the problem of IA is not as widespread as it may appear because conservative prevalence rates are systematically reported by the broad majority of empirical studies.

Additionally, IA has been described across the literature as being associated with a wide range of co-occurring psychiatric comorbidities alongside an array of dysfunctional behavioural patterns. For instance, the review by Pontes et al. (2015) noted that IA has been associated with low life satisfaction, low academic performance, less motivation to study, poorer physical health, poor sleep/insomnia, social anxiety, attention deficit/hyperactivity disorder, depression, poorer emotional wellbeing, substance use, higher impulsivity,

cognitive distortion, deficient self-regulation, poorer family environment, higher mental distress, loneliness, among other negative psychological, biological, and neuronal aspects.

Examining the literature as a whole, it is clear that uncertainties regarding its status and criteria as to what constitutes as IA have not yet reached consensus in the field (Van Rooij & Prause, 2014). Ultimately, in order to achieve a scientific consensus, researchers will have to adopt a standard definition of IA and also develop a solid theoretical framework that provides sufficient information on the conceptualisation and operationalisation of this phenomenon, both qualitatively and quantitatively, as well as in clinically diagnostic terms (Pontes et al., 2015)

In a recent qualitative study (Kuss & Griffiths, 2015) including 20 IA treatment experts across six countries and two continents, IA was viewed as a clinically relevant phenomenon that significantly impairs the individual who is seeking professional help for their problematic behaviours in the context of psychotherapy. The psychotherapists interviewed unanimously viewed excessive Internet use as potential addiction, as their clients' presenting problem typically includes the experienced symptoms (i.e., salience, mood modification, tolerance, withdrawal, conflict, and relapse) and negative consequences. This suggests IA is gradually gaining recognition in the clinical field, and psychotherapists are becoming increasingly aware of the problem whilst developing specialised inpatient and outpatient treatment approaches for those in need of treatment.

The many different understandings and conceptualisations for what appears to be the same phenomenon (i.e., IA) has generated confusion and methodological difficulties that have somewhat hindered the progress of the field. Most notably, the diversity in how to conceptualise and define the concept is perhaps illustrated by the heterogeneity of prevalence rates of IA found worldwide. Although prevalence rates reported of IA in nationally representative samples may range from a minimum of 1% to a maximum of 18.7%, the disparity and discrepancy among these rates are obvious, and therefore the consistency of the assessment and theoretical framework of IA adopted by researchers is put into question.

Conclusions

Addiction, whether it is to gambling, video gaming or Internet use, is a multi-faceted behaviour that is strongly influenced by contextual factors that cannot be encompassed by any single theoretical perspective. These factors include variations in behavioural involvement and motivation across different demographic groups, structural characteristics of activities/substances, and the developmental or temporal nature of addictive behaviour. Research and clinical interventions are best served by a biopsychosocial approach that incorporates the best strands of contemporary psychology, biology and sociology (Griffiths, 2005).

Griffiths and Larkin have suggested that there are core components of what a successful theory of addictions should contain (Larkin & Griffiths, 1998; Griffiths & Larkin, 2004). A successful theory must (i) synthesise pharmacological, cultural, situational and personality factors, (ii) account for the varying nature of addiction across cultures, individuals and time, (iii) account for commonalities between all addictions, and (iv) be faithful to lived human experience.

Larkin and Griffiths (1998; Griffiths & Larkin, 2004) have also argued the case for a complex systems model of addiction. "Complex" for obvious reasons, and "systems" after Davies (1992), who argued that alternative explanations for excessive behaviours require *"the development of a 'system' within which drug use is conceived of as an activity carried out for positive reasons, by people who make individual decisions about their substance use, and who may take drugs competently as well as incompetently"* (p. 163). On the basis of Polkinghorne's (1993) observations, a more flexible theoretical approach, such as the complex systems model, ought to go some way toward bridging the epistemological gap.

The complex systems model corresponds well to the biopsychosocial approach to addiction. It may also be considered to be a descendent of previous multi-factorial approaches to the addiction process (e.g., Zinberg, 1984). From the perspective of the complex systems model, it is possible to consider the interaction of both the common and the unique elements of any specific individual's situation. This includes psychological, physiological, social, and cultural factors that may be particular to any individual. It also allows for consideration of the

pharmacological properties of specific substances, or the reinforcing properties of certain kinds of gaming machines (see Griffiths, 2002). It is important, therefore, to point out that this is not a return to citing the property of 'addictiveness' as located within particular substances (or within particular activities). However, it is necessary to be aware of effects that may be common to certain kinds of substances or activities, but not to others.

Before concluding this chapter, it is worth mentioning that several scholars have criticised the process by which excessive behaviours tend to be conceptualised as addictive behaviours, leading to a never ending list of potential behavioural addictions (Billieux, Schimmenti, Khazaal, Maurage, & Heeren, 2015; Kardefelt-Winther, 2015; Mihordin, 2012). This process, termed the "confirmative approach" by Billieux et al. (2015), comprises three steps. First, based on clinical observations, a dysfunctional behaviour (e.g., excessive dancing) is *a priori* considered as an addictive behaviour. Second, screening tools are developed according to traditional substance abuse criteria (e.g., transposing substance abuse criteria in the context of dance addiction). Third, the biopsychosocial correlates of the newly identified behavioural addiction are explored in relationship through established risk factors for substance addictions (e.g., impulsivity traits). Generally, such studies highlight moderate to strong correlations between the risk factors explored and the presence of addiction symptoms. This is obviously due to the fact the items assessing addiction symptoms were based on the substance abuse framework.

The main consequence of this trend, which has all the more been fostered with the recognition of pathological gambling as an addiction in the DSM-5, is the growing pathologisation of everyday behaviours. Ultimately, such approach of excessive behaviours could result in the standardisation of treatment approaches (i.e. applying substance addiction-inspired treatments to these new conditions), which implies neglecting their uniqueness and idiosyncrasies. Caution is thus warranted, and various types of data are required (i.e., behavioural along with neurobiological data), before any attempt to conceptualise daily behaviours or leisure as new addictions.

Hopefully what this chapter has demonstrated is that addictions are a part of a biopsychosocial process and are not just restricted to drug-ingested behaviours. Evidence is

growing that excessive behaviours of all types seem to have many commonalities and this may reflect a common aetiology of addictive behaviour. Such commonalities may have implications not only for treatment and prevention of such behaviours but also for how the general public perceive such behaviours. Ultimately, understanding addictions as the consequences of biopsychosocial processes rather than from an addictive personality perspective may also serve the function of destigmatising individuals who are suffering from substance-related or behavioural addictions, whilst paving the way for successful recovery processes.

References

Allison, S. E., von Wahlde, L., Shockley, T., & Gabbard, G. O. (2006). The development of the self in the era of the Internet and role-playing fantasy games. *American Journal of Psychiatry, 163,* 381–385.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders (5th ed.)*. Washington, DC: Author.

Andreassen, C. S., Griffiths, M. D., Hetland, J., Kravina, L., Jensen, F., & Pallesen, S. (2014). The prevalence of workaholism: A survey study in a nationally representative sample of Norwegian employees. *PLoS ONE, 9*(8): e102446. doi:10.1371/journal.pone.0102446.

Atroszko, P. A., Andreassen, C. S., Griffiths, M. D. & Pallesen, S. (2015). Study addiction – A new area of psychological study: Conceptualization, assessment, and preliminary empirical findings. *Journal of Behavioral Addictions,* DOI: 10.1556/2006.4.2015.007.

Batthyány, D., Müller, K. W., Benker, F., & Wölfling, K. (2009). Computer game playing: clinical characteristics of dependence and abuse among adolescents. *Wiener Klinische Wochenschrift, 121*(15–16), 502–509.

Berczik, K., Griffiths, M. D., Szabó, A., Kurimay, T., Kökönyei, G., Urbán, R. and Demetrovics, Z. (2014). Exercise addiction – the emergence of a new disorder. *Australasian Epidemiologist*, *21*(2), 36-40.

Betz, C., Mihalic, D., Pinto, M. E., & Raffa, R. B. (2000). Could a common biochemical mechanism underlie addictions? *Journal of Clinical Pharmacy and Therapeutics, 25*(1), 11-20.

Billieux, J., Maurage, P., Lopez-Fernandez, O., Kuss, D. J. & Griffiths, M.D. (2015). Can disordered mobile phone use be considered a behavioral addiction? An update on current evidence and a comprehensive model for future research. *Current Addiction Reports, 2*, 154-162.

Billieux, J., Lagrange, G., Van der Linden, M., Lançon, C., Adida, M., & Jeanningros, R. (2012). Investigation of impulsivity in a sample of treatment seeking pathological gamblers: A multidimensional perspective. *Psychiatry Research*, *198*, 291-296.

Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, *4,* 119–123.

Billieux, J., Thorens, G., Khazaal., Y., Zullino, D., Achab, S., & Van der Linden, M. (2015). Problematic involvement in online games: A cluster analytic approach. *Computers in Human Behavior*, *43*, 242-250.

Billieux, J., Van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviours in the virtual world of Azeroth. *Computers in Human Behavior*, *29*, 103-109.

Billieux, J., Van der Linden, M., Khazaal, Y., Zullino, D., & Clark, L. (2012). Trait gambling cognitions predict near-miss experiences and persistence in laboratory slot machine gambling. *British Journal of Psychology*, *103*, 412-427.

Blaszczynski, A., Steel, Z., & McConaghy, N. (1997). Impulsivity in pathological gambling: the antisocial impulsivist. *Addiction*, *92*, 75-87.

Block, J. J. (2008). Issues for DSM-V: Internet addiction [Editorial]. *American Journal of Psychiatry, 165*, 306.

Breiter, H. C., Aharon, I., Kahneman, D., Dale, A., & Shizgal, P. (2001). Functional imaging of neural responses to expectancy and experience of monetary gains and losses. *Neuron, 30*(2), 619-639.

Brewer, J. A., & Potenza, M. N. (2008). The neurobiology and genetics of impulse control disorders: Relationships to drug addictions. *Biochemical Pharmacology, 75*, 63-75.

Brown, R. I. F. (1993). Some contributions of the study of gambling to the study of other addictions. In W.R. Eadington & J. Cornelius (Eds.), *Gambling Behavior and Problem Gambling*, pp.341-372. Reno, Nevada: University of Nevada Press.

Burglass, M. E. & Shaffer, H. J. (1984). Diagnosis in the addictions I: Conceptual problems. *Addictive Behaviors,* 3, 19-34.

Carnes, P. (1991). *Don't call it love: Recovery from sexual addiction.* New York: Bantam Books.

Carnes, P. J., Murray, R. E., & Charpentier, L. (2005). Bargains with chaos: Sex addicts and addiction interaction disorder. *Sexual Addiction & Compulsivity, 12*, 79-120.

Chan, P. A., & Rabinowitz, T. (2006). A cross-sectional analysis of video games and attention deficit hyperactivity disorder symptoms in adolescents. *Annals of General Psychiatry, 5*(1), 16–26.

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

Cheng, C., & Li, A. Y. (2014). Internet addiction prevalence and quality of (real) life: A meta-analysis of 31 nations across seven world regions. *Cyberpsychology, Behavior and Social Networking, 17,* 755-760.

Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52*(4), 281-302.

Davies, J. B. (1992). *The myth of addiction: An application of the psychological theory of attribution to illicit drug use.* Reading: Harwood Academic.

Demetrovics, Z., Urbán, R., Nagygyörgy, K., Farkas, J., Griffiths, M. D., Pápay, O., . . . Oláh, A. (2012). The development of the Problematic Online Gaming Questionnaire (POGQ). *PLoS ONE, 7*(5), e36417.

Douglas, A. C., Mills, J. E., Niang, M., Stepchenkova, S., Byun, S., Ruffini, C., Lee, S. K., Loutfi, J., Lee, J.-K., & Atallah, M. (2008). Internet addiction: Meta-synthesis of qualitative research for the decade 1996–2006. *Computers in Human Behavior, 24*(6), 3027-3044

Dowling, N. A. (2014). Issues raised by the DSM-5 internet gaming disorder classification and proposed diagnostic criteria. *Addiction, 109*(9), 1408-1409.

Ferguson, C. J., Coulson, M., & Barnett, J. (2011). A meta-analysis of pathological gaming prevalence and comorbidity with mental health, academic and social problems. *Journal of Psychiatric Research, 45*(12), 1573-1578.

Fisher, S. E. (1994). Identifying video game addiction in children and adolescents. *Addictive Behaviors*, *19,* 545–553.

Frankfort-Nachmias, C., & Nachmias, D. (1996). *Research methods in the social sciences* (5 ed.). London: St Martin's Press.

Gentile, D. A. (2009). Pathological video-game use among youth ages 8 to 18: a national study. *Psychological Science, 20*(5), 594-602.

Gentile, D. A., Choo, H., Liau, A., Sim, T., Li, D. D., Fung, D., & Khoo, A. (2011). Pathological video game use among youths: a two-year longitudinal study. *Pediatrics, 127*(2), 319-329.

Goodman, A. (2008). Neurobiology of addiction: An integrative review. *Biochemical pharmacology*, *75*(1), 266-322.

Griffiths, M. D. (1991). Amusement machine playing in childhood and adolescence: A comparative analysis of video games and fruit machines. *Journal of Adolescence*, 14, 53-73.

Griffiths, M. D. (1992). Pinball wizard: The case of a pinball machine addict. *Psychological Reports*, *71*, 160-162.

Griffiths, M. D. (1993). Fruit machine gambling: The importance of structural characteristics. *Journal of Gambling Studies*, *9*, 133-152.

Griffiths, M. D. (1994). The role of cognitive bias and skill in fruit machine gambling. *British Journal of Psychology, 85,* 351-369.

Griffiths, M. D. (1996). Behavioural addictions: An issue for everybody? *Journal of Workplace Learning, 8*(3), 19-25.

Griffiths, M. D. (1997). Computer game playing in early adolescence. *Youth and Society*, *29*, 223-237.

Griffiths, M. D. (1999). Gambling technologies: Prospects for problem gambling. *Journal of Gambling Studies, 15,* 265-283.

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

Griffiths, M. D. (2002). *Gambling and gaming addictions in adolescence.* Leicester: British Psychological Society/Blackwells.

Griffiths, M. D. (2004). Betting your life on it: Problem gambling has clear health related consequences. *British Medical Journal, 329*, 1055-1056.

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

Griffiths, M. D. (2006). An overview of pathological gambling. In T. Plante (Ed.), *Mental Disorders of the New Millennium. Vol. I: Behavioral issues* (pp. 73-98). New York: Greenwood.

Griffiths, M. D. (2007). *Gambling addiction and its treatment within the NHS*. London: British Medical Association.

Griffiths, M. D. (2008). The biopsychosocial and "complex" systems approach as a unified framework for addiction. *Behavioral and Brain Sciences, 31,* 446-447.

Griffiths, M. D. (2009). Casino design: Understanding gaming floor influences on player behaviour. *Casino and Gaming International, 5*(1), 21-26.

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

Griffiths, M. D. (2014a). What's new in problem gambling? *Counselor,* October, 45-49.

Griffiths, M. D. (2014b). *Problem gambling in Great Britain: A brief review*. London: Association of British Bookmakers.

Griffiths, M.D. (2016). Problem gambling and gambling addiction are not the same. *Journal of Addiction and Dependence*, *2*(1), 1-3.

Griffiths, M. D. & Davies, M. N. O. (2005). Videogame addiction: Does it exist? In J. Goldstein & J. Raessens (Eds.), *Handbook of Computer Game Studies* (pp. 359-368). Boston: MIT Press.

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

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

Griffiths, M. D. & Kuss, D. J. (2015). Online addictions: The case of gambling, video gaming, and social networking. In Sundar, S.S. (Ed.), *Handbook of the Psychology of Communication Technology* (pp.384-403). Chichester: Wiley-Blackwell.

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. & Larkin, M. (2004). Conceptualizing addiction: The case for a 'complex systems' account. *Addiction Research and Theory*, *12*, 99-102.

Griffiths, M. D. & Parke, J. (2003). The environmental psychology of gambling. In G. Reith (Ed.), *Gambling: Who wins? Who loses?* (pp. 277-292). New York: Prometheus Books.

Griffiths, M. D., Parke, J. & Wood, R. T. A. (2002). Excessive gambling and substance abuse: Is there a relationship? *Journal of Substance Use*, *7*, 187-190.

Griffiths, M. D., & Pontes, H. M. (2014). Internet Addiction Disorder and Internet Gaming Disorder are not the aame. *Journal of Addiction Research and Therapy, 5*(4), e124. doi: 10.4172/2155-6105.1000e124

Griffiths, M. D. & Smeaton, M. (2002). Withdrawal in pathological gamblers: A small qualitative study. *Social Psychology Review, 4,* 4-13.

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.

Griffiths, M. D. & Wood, R. T. A. (2001). The psychology of lottery gambling. *International Gambling Studies*, *1,* 27-44.

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.

Johansson, A., Grant, J. E., Kim, S. W., Odlaug, B. L., & Gotestam, K. G. (2009). Risk factors for problematic gambling: A critical literature review. *Journal of Gambling Studies, 25*, 67-92.

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

Kendler, K. S. (2005). Psychiatric genetics: A methodologic critique. *American Journal of Psychiatry*, *162,* 3–11.

Kardefelt-Winther, D. (2015). A critical account of DSM-5 criteria for internet gaming disorder. *Addiction Research and Theory*, *23,* 93-98..

Kim S. W., Grant J. E., Eckert E. D., Faris P. L. & Hartman B. K. (2006). Pathological gambling and mood disorders: clinical associations and treatment implications. *Journal of Affective Disorders*, *92*, 109-116.

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.

King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2011). The role of structural characteristics in problematic video game play: An empirical study. *International Journal of Mental Health and Addiction, 9*, 320-333.

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, 26,* 43-56.

King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2013). Video game addiction. In P. Miller (Ed.) *Principles of Addiction: Comprehensive Addictive Behaviors and Disorders.* (Vol. 1, pp. 819-825). San Diego: Academic Press.

King, D. L., Delfabbro, P. H., & Zajac, I. T. (2011). Preliminary validation of a new clinical tool for identifying problem video game playing. *International Journal of Mental Health and Addiction, 9*, 72-87.

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.

Király, O, Griffiths, M.D., Urbán, R, et al. (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.

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.

Krivanek, J. (1988). *Addictions*. London: Allen and Unwin.

Kuczmierczyk, A. R., Walley, P. B., & Calhoun, K. S. (1987). Relaxation training, in vivo exposure and response-prevention in the treatment of compulsive video-game playing. *Scandinavian Journal of Behaviour Therapy*, *16*, 185–190.

Kuss, D. J. (2013). Internet gaming addiction: Current perspectives. *Psychology Research and Behavior Management, 6*, 125-137.

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

Kuss, D. J., & Griffiths, M. D. (2012a). Internet gambling addiction. *Encyclopedia of Cyber Behavior* (pp. 735-753). Pennsylvania: IGI Global.

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

Kuss, D. J., Louws, J., & Wiers, R. W. W. (2012). Online gaming addiction? Motives predict addictive play behavior in Massively Multiplayer Online Role-Playing Games *Cyberpsychology, Behavior and Social Networking, 15*(9), 480-485.

Kuss, D. J., Griffiths, M. D., Karila, L. & Billieux, J. (2014a). Internet addiction: A systematic review of epidemiological research for the last decade. *Current Pharmaceutical Design,* 20, 4026-4052.

Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. (2014b). Assessing Internet addiction using the parsimonious Internet addiction components model - A preliminary study. *International Journal of Mental Health and Addiction, 12*, 351-366.

Kuss, D. J., Shorter, G. W., van Rooij, A. J., van de Mheen, D., & Griffiths, M. D. (2014c). The Internet addiction components model and personality: Establishing construct validity via a nomological network. *Computers in Human Behavior, 39*, 312-321.

Larkin, M. & Griffiths, M. D. (1998). Response to Shaffer (1996): The case for 'complex systems' conceptualizations of addiction, *Journal of Gambling Studies, 14*, 73-82.

Larkin, M. & Griffiths, M. D. (2004). Dangerous sports and recreational drug-use: Rationalising and contextualising risk. *Journal of Community and Applied Social Psychology*, *14,* 215-232.

Larkin, M., Wood, R. T. A. & Griffiths, M. D. (2006). Towards addiction as relationship. *Addiction Research and Theory, 14,* 207-215.

Lin, I., Ko, C-H., Chang, Y-P., et al. (2014). The association between suicidality and internet addiction and activities in Taiwanese adolescents. *Comprehensive Psychiatry,* 55, 504-510.

Maraz, A., Eisinger, A., Hende, Urbán, R., Paksi, B., Kun, B., Kökönyei, G., Griffiths, M. D. & Demetrovics, Z. (2015). Measuring compulsive buying behaviour: Psychometric validity of three different scales and prevalence in the general population and in shopping centres. *Psychiatry Research*, *225,* 326–334.

Maraz, A., Urbán, R., Griffiths, M.D. & Demetrovics Z. (2015). An empirical investigation of dance addiction. *PloS ONE*, 10(5): e0125988. doi:10.1371/journal.pone.0125988.

Marks, I. (1990). Behaviour (non-chemical) addictions. *British Journal of Addiction, 85*, 1389-1394.

Marlatt, G. A., Baer, J. S., Donovan, D. M. & Kivlahan, D. R. (1988). Addictive behaviors: Etiology and treatment. *Annual Review of Psychology, 39,* 223-252.

McIlwraith, R., Jacobvitz, R.S., Kubey, R. & Alexander, A. (1991). Television addiction: Theories and data behind the ubiquitous metaphor. *American Behavioral Scientist, 35*, 104-121.

MacLaren, V. V., & Best, L. A. (2010). Multiple addictive behaviors in young adults: Student norms for the Shorter PROMIS Questionnaire. *Addictive Behaviors, 35*, 252-255.

Meule, A. & Gearhardt, A. (2014). Food addiction in the light of DSM-5. *Nutrients, 6*(9), 3653-3671.

Meyer, G., Hayer, T. & Griffiths, M.D. (2009). *Problem gaming in Europe: Challenges, prevention, and interventions.* New York: Springer.

Mihordin, R. (2012). Behavioral addiction – Quo Vadis? *The Journal of Nervous and Mental Disease*, *200*, 489–491.

Montag, C., Bey, K., Sha, P., Li, M., Chen, Y. F., Liu, W. Y., Zhu, Y. K., Li, C. B., Markett, S., & Keiper, J. (2014). Is it meaningful to distinguish between generalized and specific Internet addiction? Evidence from a cross-cultural study from Germany, Sweden, Taiwan and China. *Asia Pacific Psychiatry*. doi: 10.1111/appy.12122

Orford, J. (2001). *Excessive appetites: A psychological view of the addictions (*2nd *ed.).* Chichester: Wiley.

Pápay, O., Nagygyörgy, K., Griffiths, M. D. & Demetrovics, Z. (2014). Problematic online gaming. In K. Rosenberg & L. Feder (Eds.), *Behavioral addictions: Criteria, evidence and treatment* (pp.61-95). New York: Elsevier.

Parke, J. & Griffiths, M. D. (2006). The psychology of the fruit machine: The role of structural characteristics (revisited). *International Journal of Mental Health and Addiction, 4,* 151-179.

Parke, J. & Griffiths, M. D. (2007). The role of structural characteristics in gambling. In G. Smith, D. Hodgins & R. Williams (Eds.), *Research and measurement issues in Gambling Studies* (pp.211-243). New York: Elsevier.

Parke, J., Griffiths, M. D. & Parke, A. (2007). Positive thinking among slot machine gamblers: A case of maladaptive coping? *International Journal of Mental Health and Addiction, 5,* 39-52.

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 pattern of play. *Journal of Adolescence*, *18*, 687-691.

Polkinghorne, D. E. (1992). Postmodern epistemology of practice. In Kvale, S. (Ed), *Psychology and postmodernism*. London: Sage.

Pontes, H. M., Király, O., Demetrovics, Z., & Griffiths, M. D. (2014). The Conceptualisation and Measurement of DSM-5 Internet Gaming Disorder: The Development of the IGD-20 Test. *PLoS ONE, 9*(10), e110137. doi: 10.1371/journal.pone.0110137

Pontes, H. M., Kuss, D. J. & Griffiths, M. D. (2015). The clinical psychology of Internet addiction: A review of its conceptualization, prevalence, neuronal processes, and implications for treatment. *Neuroscience and Neuroeconomics, 4*, 11-23.

Pontes, H. M., & Griffiths, M. D. (2015). Internet Gaming Disorder and its associated cognitions and cognitive-related impairments: A systematic review using PRISMA guidelines. *Revista Argentina de Ciencias del Comportamiento, 7*(3), 102-118.

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

Potenza, M. N. (2001). The neurobiology of pathological gambling. *Seminars in Clinical Neuropsychiatry, 6*(3), 217-226.

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.

Robins, L. N, Helzer, J. E, & Davis, D. H (1975). Narcotic use in Southeast Asia and afterward. *Archives of General Psychiatry, 32,* 955-961.

Rosenthal, R. & Lesieur, H. (1992). Self-reported withdrawal symptoms and pathological gambling. *American Journal of the Addictions*, 1, 150-154.

Rumpf, H. J., Vermulst, A. A., Bischof, A., et al. (2014). Occurence of internet addiction in a general population sample: A latent class analysis. *European Addiction Research, 20*(4), 159-166.

Salguero, R. A. T., & Moran, R. M. B. (2002). Measuring problem video game playing in adolescents. *Addiction, 97*, 1601–1606.

Shaffer, H. J. (1996). Understanding the means and objects of addiction: Technology, the Internet, and gambling. *Journal of Gambling Studies,* 12, 461–469.

Shaffer, H. J., LaPlante, D. A., LaBrie, R. A., Kidman, R. C., Donato, A. N. & Stanton, M. V. (2004). Towards a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry*, *12,* 1-8.

Schneider, J. P., & Irons, R. R. (2001). Assessment and treatment of addictive sexual disorders: Dependency relapse. *Substance Use and Misuse. 36*, 1795-1820.

Skoric, M. M., Teo, L. L. C., & Neo, R. L. (2009). Children and video games: addiction, engagement, and scholastic achievement. *CyberPsychology and Behavior, 12*, 567–572.

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

Sussman, S., Lisha, N. & Griffiths, M. D. (2011). Prevalence of the addictions: A problem of the majority or the minority? *Evaluation and the Health Professions*, *34,* 3-56.

Sussman, S., & Unger, J. B. (2004). A "drug abuse" theoretical Integration: A transdisciplinary speculation. *Substance Use and Misuse, 39*, 2055-2069.

Truan, F. (1993). Addiction as a social construction: A postempirical view. *Journal of Psychology, 127,* 489-499.

Tyndale, R. F. (2003). Genetics of alcohol use and tobacco use in humans. *Annals of Medicine, 35*(2), 94–121.

Van Rooij, T., A. J., Meerkerk, G. Schoenmakers, T. M., Griffiths, M. D. & van de Mheen, D. (2010). Video game addiction and social responsibility, *Addiction Research and Theory, 18,* 489-493.

Van Rooij, A., & Prause, N. (2014). A critical review of "Internet addiction" criteria with suggestions for the future. *Journal of Behavioral Addiction, 3,* 203-213.

Volkow, N. D., & Wise, R. A. (2005). How can drug addiction help us understand obesity? *Nature Neuroscience, 8*, 555-560.

Walker, M.B. (1989). Some problems with the concept of "gambling addiction": Should theories of addiction be generalized to include excessive gambling? *Journal of Gambling Behavior*, 5, 179-200.

Walters, G. D. (2002). The heritability of alcohol use and dependence: A meta-analysis of behavior genetic research. *American Journal of Drug and Alcohol Abuse,* 28, 557–584.

Weinstein, A., Feder, L. C., Rosenberg, K.P., & Dannon, P. (2014) Internet Addiction Disorder: Overview and controversies. In: Rosenberg K. P. & Feder, L. C (Eds.). *Behavioral addictions* (pp.99-117). San Diego: Academic Press.

West, R. (2001). Theories of addiction. *Addiction, 96*(1), 3-13.

Westwood, D. & Griffiths, M. D. (2010). The role of structural characteristics in video game play motivation: A Q-Methodology study. *Cyberpsychology, Behavior and Social Networking, 13,* 581-585.

Wood, R. T. A., Griffiths, M. D., Chappell, D. & Davies, M. N. O. (2004). The structural characteristics of video games: A psycho-structural analysis. *CyberPsychology and Behavior, 7,* 1-10.

Yee, N. (2006). Motivations for play in online games. *CyberPsychology and Behavior*, *9*, 772–775.

Yellowlees, P. M. & Marks, S. (2007). Problematic Internet use or Internet addiction? *Computers in Human Behavior, 23,* 1447-1453.

Young, K. (1998). *Caught in the net*. Chichester: Wiley.

Young, K. S., Pistner, M., O'Mara, J., & Buchanan. J. (1999). Cyber disorders: The mental health concern for the new millennium. *CyberPsychology and Behavior, 2*, 475-479.

Zinberg, N. E (1984) *Drug, set, setting: The basis for controlled intoxicant use*. New Haven: Yale University Press.

Table 1: 10 Signs of Addiction
(adapted from Carnes [1991])

(1) A pattern of out of control behaviour
(2) Severe consequences due to behaviour
(3) Inability to stop behaviour despite adverse consequences
(4) Persistent pursuit of self destructive or high risk behaviour
(5) Ongoing desire or effort to limit behaviour
(6) Uses behaviour as a coping strategy
(7) Increased amounts of behaviour because the current level of activity is no longer sufficient
(8) Severe mood changes around behaviour
(9) Inordinate amounts of time spent trying to engage in behaviour and recovering from it
(10) Important social, occupational and recreational activities are sacrificed or reduced because of behaviour

Table 2: DSM-5 Diagnostic Criteria for Gambling Disorder
(American Psychiatric Association, 2013)

A. Persistent and recurrent problematic gambling behavior leading to clinically significant impairment or distress, as indicated by the individual exhibiting four (or more) of the following in a 12-month period:

1. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
2. Is restless or irritable when attempting to cut down or stop gambling.
3. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
4. Is often preoccupied with gambling (e.g., having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
5. Often gambles when feeling distressed (e.g., helpless, guilty, anxious, depressed).
6. After losing money gambling, often returns another day to get even ("chasing" one's losses).
7. Lies to conceal the extent of involvement with gambling.
8. Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
9. Relies on others to provide money to relieve desperate financial situations caused by gambling.

B. The gambling behavior is not better explained by a manic episode.