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Understanding internet gaming addiction in clinical practice

ARTICLE

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SUMMARY

Internet gaming disorder (IGD) is a condition in which the individual is preoccupied with playing online video games and unable to regulate this behaviour, resulting in adverse physical and psychological consequences. Although there is some debate about whether IGD is an addiction or a coping mechanism, global evidence indicates that the condition is increasing in prevalence with recent advances in technology and its higher penetration into routine life. Male children and adolescents located in East Asian countries are at higher risk than others in the world. Attention-deficit hyperactivity disorder, depression and anxiety are typically associated with IGD. Given the continuing ambiguity regarding the diagnosis and screening tools for the disorder, it has become all the more relevant for mental health practitioners and academics to attend to this condition and develop evidence-based treatments. This review summarises both the existing evidence for the disorder and the debates that surround it.

LEARNING OBJECTIVES

After reading this article you will be able to:
understand the differing definitions and conceptualisations of internet gaming disorder (IGD)
recognise risk factors, clinical features and evidence-based treatment associated with IGD
recognise the challenges ahead surrounding the diagnosis and treatment of IGD.

KEYWORDS

Internet gaming disorder; gaming disorder; internet addiction; DSM-5; ICD-11.

A video game is a form of interactive digital entertainment that has to be 'played' by the user in an act known as video or digital gaming (or simply, gaming) – one of the most popular acts of leisure in everyday life for children, adolescents and adults in the world (Przybylski 2017). Video games can be of many different kinds, depending on the genre (e.g. strategy games, shooting games, simulations), number of players (e.g. single-player, multiplayer), platform (e.g. arcade machine, gaming console, personal computer, mobile phone), hardware used to play (e.g. keyboard, motion sensors) and internet connectivity (e.g. online or offline), with players collaborating or competing to achieve some objective (Griffiths 2012). Each video game has its own version of what it means to succeed. The most popular type of online game is massively multiplayer online role-playing games (MMORPGs), which integrate several of these characteristics into a single experience. Video games have a psychological effect on gamers, as they allow them to engage with an alternate reality, experience different emotions, socialise with new people, change their mood or simply pass time (Ryan 2006).

Increasing instances of gamers being unable to control their gaming behaviour have compelled clinicians and researchers to consider whether gaming may have the potential to cause significant harm (Kuss 2012) and have given rise to the development of the diagnostic categories of 'gaming disorder' (as described in ICD-11; World Health Organization 2018b) and 'internet gaming disorder' (as described in DSM-5; American Psychiatric Association 2013).

Terminology

Before proceeding, we would like to acknowledge a conceptual problem within the field of addiction to internet gaming, i.e. the three overlapping concepts – internet addiction, gaming disorder and internet gaming disorder. These terms, often used interchangeably, are subtly different from each other. Internet addiction is an umbrella term historically used to describe the behaviour of people who were excessively engaged with online activities such as chatting and gaming. There is a repository of research on internet addiction, although the condition itself has never formally entered the medical lexicon (Griffiths 2016). More recent studies have asserted that the term internet addiction lacks specificity (as it is not possible for an individual to be addicted to the internet itself) and that the internet merely facilitates increased engagement in certain behaviours (Griffiths 2016). Gaming disorder is the term used to describe an addiction to both digital games and video games, as used in ICD-11 (World Health Organization 2018b). On the other

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hand, internet gaming disorder is used widely to describe excessive online gaming behaviour, and is identified as a potential psychological condition in DSM-5 (American Psychiatric Association 2013).

We recognise the conceptual strength of the ICD-11 definition of gaming disorder because it includes online and offline games (as DSM-5 internet gaming disorder refers only to online games), even though the DSM-5 definition of internet gaming disorder has been used more widely for critical analysis, diagnosis and treatment. Through the course of this article, criticisms and controversies regarding both definitions will be discussed. Consequently, this article includes evidence on both gaming disorder and internet gaming disorder. We will use the abbreviation IGD as an umbrella term, unless the context requires that a specific term be used.

Current conceptualisations and their consequences

The ICD-11 defines gaming disorder as a 'pattern of gaming behaviour ("digital-gaming" or "video-gaming") characterized by impaired control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities, and continuation or escalation of gaming despite the occurrence of negative consequences' (World Health Organization 2018a). It further states that 'for gaming disorder to be diagnosed, the behaviour pattern must be of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning and would normally have been evident for at least 12 months'. This definition, although an improvement on the heavily criticised definition of internet gaming disorder provided by DSM-5 (discussed in more detail below), does not enjoy the full support of the clinical community, as it is considered to 'over-pathologise' a recreational activity and misclassify a coping mechanism as an addiction disorder (van Rooij 2018).

Consequences of IGD as captured by studies by King & Delfabbro (2018), Kuss & Griffiths (2012) and Gentile et al (2011) include: mood changes and feeling bored, angry and/or irritable; depression, anxiety and increased risk of suicide; poor physical health, disrupted sleep patterns and poor diet, including overconsumption of caffeine; conflict in social situations and interpersonal relationships leading to loss of friendships, feelings of isolation and even divorce; financial insecurity and reduced productivity at work, with absenteeism and dropout.

Despite the growing clarity regarding the conceptualisation of the disorder and its impact, understanding IGD as it stands today is impossible without acknowledging the history and burgeoning debate that mire its conceptualisation and acceptance by the scientific and clinical community.

Origins and evolution of IGD

Video games first emerged as a source of distress in the 1980s, a decade after they became commercially available to gamers. The first reference to video game 'addiction' was made in a study by two school counsellors (Soper 1983), who observed compulsive behaviour, a lack of interest in other activities and withdrawal symptoms (when made to stop playing video games) in their students. Although the argument for video game addiction as a condition was strengthened by a handful of successful treatment studies during that time, most research in the 1980s involved case studies using observational or anecdotal data and focused on only one form of gaming (Griffiths 2012). In the 1990s, the scope of research on video game addiction was broadened from arcade gaming to gaming on personal computers and consoles. In these studies, researchers performed clinical assessments by using adapted versions of the DSM-III and DSM-IV diagnostic criteria for gambling (Griffiths 2012). These studies were criticised and were ultimately found to be assessing video game preoccupation rather than video game addiction (Griffiths 2012). In the next two decades, gaming became more sophisticated and complex, as did the research on gaming addiction. With the advent of the internet and MMORPGs, the scope of research could span a wider variety of games and include data that were not previously available from a broader sample of both males and females (Griffiths 2012). A big boost to research on the condition came in 2013 when DSM-5 identified internet gaming disorder as a 'condition for further study' (American Psychiatric Association 2013).

DSM-5 defines internet gaming disorder as 'persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress' (American Psychiatric Association 2013). The diagnostic threshold in DSM-5 is meeting five or more of nine criteria over a 12-month period. These criteria include, for example, preoccupation with gaming behaviour, inability to regulate gaming behaviour. withdrawal symptoms when gameplay is stopped, loss of control over the gaming behaviour and significant harm resulting from the activity. This conceptualisation was met with widespread criticism as it was found to rely too heavily on the perceived addictive nature of gaming behaviours and to be built on established addiction research.

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BOX 1 Ongoing debates about internet gaming disorder (IGD)

Can IGD be considered an addiction?

Many scholars have argued that conceptualising IGD as an addiction is restrictive and precludes development of evidence that suggests it might be a different condition, for instance a coping mechanism for dealing with negative emotions, stress or fear, or a diversion from reality (Kardefelt-Winther 2014; van Rooij 2018).

It has been argued that increased engagement with gaming can be considered a 'phase', especially during adolescence, when prevalence of IGD has been found to be the highest (Kuss 2017). On the other hand, brain imaging studies have shown that people addicted to gaming experience neural activity similar to those with substance use disorders (Kuss 2018), strengthening the case for IGD to be considered an addiction.

It should be noted that 'gaming' is a lucrative occupation for professional gamers, who are paid salaries to compete with others for entertainment of themselves or others. These players spend 20–30 h a week playing online games, and the cut-off used typically for problematic gameplay is 4 h per day or 30 h per week (King 2018). In these cases, it becomes difficult to define the player as a gaming addict, even though they are engaging in a 'dangerous level' of gameplay (Kuss 2017), as it can be argued that undertaking any activity as a paid profession is conceptually entirely different from undertaking what looks like similar activity, but in a manner that is detrimental to the individual. Of course it is also possible that some professional gamers may also develop a gaming disorder – but the criteria used to define whether or not they have developed such a disorder would not include the amount of time that they are paid to spend gaming.

What are the problems with the DSM-5 clinical criteria?

The concept of preoccupation as associated with IGD has been met with criticism, as it is seen to pathologise an otherwise typical experience of child, adolescent and adult gamers alike (Kardefelt-Winther 2014). It is argued that if the preoccupation with gaming is accompanied by a measure of severity (such as the time spent preoccupied with thoughts of gaming and the intensity of those thoughts), it would be a more acceptable and effective diagnostic criterion (King 2018). The DSM-5 diagnosis 'internet gaming disorder' requires a person to have five of a list of nine criteria to be considered as having the condition (American Psychiatric Association 2013), without differentiating between primary symptoms and secondary symptoms. Finally, DSM-5 defines tolerance in internet gaming disorder as 'the need to spend increasing amounts of time engaged in Internet games' (American Psychiatric Association 2013). This definition has not been found to be adequately specific, as not every increase in time spent gaming can be considered to be a result of tolerance (King 2016).

Challenges in conceptualising IGD

In the wake of the DSM-5 classification, global consensus among researchers and clinicians has proven elusive as two major theoretical explanations have emerged to explain IGD. The first is to consider it as a non-substance addiction; the other is to view it as a coping mechanism. To a large extent, much of what is understood about IGD is drawn from studies rooted in gambling addiction and substance misuse – an approach that is contested by some scholars, who question whether gaming is an addiction at all (van Rooij 2018). As mentioned earlier, a recent critique asserted that the evidence base on gaming disorder is too weak for its inclusion in ICD-11, and that gaming is better recognised as a coping mechanism rather than a disorder in its own right (van Rooij 2018). This and other controversies are summarised in Box 1.

Global prevalence of IGD

Estimating the global prevalence of IGD continues to be a work in progress, as studies in different parts of the world use different theoretical bases, tools and standards to measure problematic gaming behaviours. There are some researchers who have attempted to consolidate the scattered data, finding with some certainty that problematic internet gaming spans the globe, from Asia to Europe and North America (Cheng 2018), and that the global level is higher among males than females and among adolescents as compared with other age groups (King 2018). A precise estimate of the overall prevalence of IGD has proven elusive, owing to methodological inconsistencies between studies, leading King & Delfabbro (2018) to conclude that the most accurate estimate of global prevalence is roughly 1%. At present, an appropriate technique to better understand prevalence of IGD is to look at nationally representative epidemiological studies from different parts of the world.

Müller et al (2015) conducted a study to measure the prevalence and psychopathological correlates of DSM-5 internet gaming disorder in seven European countries (Germany, Greece, Iceland, The Netherlands, Poland, Romania and Spain), finding that of the nearly 13 000 participants, 1.6% met the full DSM-5 criteria for the disorder and an additional 5.1% were at risk for developing the condition. Age- and gender-specific effect sizes were found to be consistent with the global trends of males and younger adolescents having higher prevalence of problematic gaming. The prevalence was found to be consistent across game genres. A study in Slovenia found the prevalence of DSM-5 internet gaming disorder to be 2.5% among a nationally representative sample of school students (mean age 13 years 5 months) (Pontes 2016).

Studies have indicated that Asian countries tend to have a higher prevalence of gaming-related conditions than other parts of the world (ranging from 1.7

BOX 2 Risk factors associated with internet gaming disorder (IGD)

Individual risk factors

- Male gender
- Low confidence
- Adolescence
- Attention-deficit hyperactivity disorder
- Aggression
- Impulsivity
- Introversion
- Depression
- Rule-breaking
- Substance use disorders/addictions
- Anxiety
- Low self-esteem
- Low self-efficacy

External risk factors

- Single-parent family
- Poor interfamily relationships
- Lower socioeconomic status
- Game-based structural characteristics

Social factors

- Manipulation and control features of games
- Narrative and identity features of games
- Reward and punishment features of games
- Game presentation

to 20%), although rates among the countries themselves vary widely (King 2018). For instance, in Singapore, a 2-year longitudinal study following primary (elementary) and secondary school students found the prevalence of pathological gaming to be approximately 9%, whereas studies in China and Taiwan have found the prevalence rates to be 10 and 7.5% respectively (Gentile 2011). In fact, these three countries recognise IGD as a significant adolescent health problem. Possible reasons for the higher prevalence rates in the region include the cultural influence of the top game developers (such as Nintendo and Konami) and the high number of players based in the area (King 2018). eSport has been included as a competitive category in the 2022 Asian Games, which is expected to contribute to making online games more acceptable as a professional sporting engagement (Bányai 2019).

North America also has high prevalence of IGD among children and adolescents, with a nationally representative sample yielding pathological patterns of play for 8% of young people between 8 and 18 years of age (Gentile 2009).

Risk factors for IGD

A diverse range of risk factors for IGD has been identified and investigated (Hyun 2015). These can be categorised as individual, external and game-related (King 2018) (Box 2).

Individual risk factors

There is consensus among researchers that males are at higher risk of developing IGD than females (Cheng 2018). This is not surprising considering that, in general, more males engage in gaming in comparison with females. However, females with IGD experience more severe symptoms than males (Müller 2015). Adolescents are at higher risk of developing IGD than other age groups, and this might be due to their neurological and developmental vulnerability, as well as their susceptibility to peer and media pressure (King 2018). In addition, personality and psychological traits such as aggressiveness, introversion and rule-breaking are also risk factors (King 2018). Intensive internet gamers have also been reported as having lower self-esteem, self-efficacy and confidence, and higher levels of anxiety (Yen 2012). For individuals with these problems, it is hypothesised that gameplay offers a platform within which they are able to create an alternate self and seek unmet psychological needs (Cheng 2018).

Psychopathologies – attention-deficit hyperactivity disorder (ADHD), impulsivity and major depressive disorder – have been found to be the strongest overall risk factors for IGD (Hyun 2015). Furthermore, it has been suggested that those with IGD display similar symptoms to those with substance use disorders or other addictions and that the latter are at higher risk of developing IGD, owing to increased common vulnerability to addictive behaviours (Cheng 2018).

External factors

Constant or close to constant access to internet devices places children and adolescents at higher risk for IGD (Gentile 2017). Parental or guardian control of internet use is therefore an important protective factor against IGD (King 2012). Various familial factors that may affect monitoring of young people's internet usage have been linked to IGD (King 2018). These include single-parent families, poor interfamily relationships and lower family socioeconomic status. These factors may also have negative psychological effects on individuals, further increasing their likelihood to use gaming as an escape from reality (Cheng 2018).

Game-related factors

Certain game characteristics have been recognised as risk factors for developing IGD. King *et al* (2010) discuss the characteristics of games that

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may be influential in excessive game playing. They highlight five key features: social; narrative and identity; reward and punishment; manipulation and control of the game; and presentation. Games that encourage social behaviour, for example MMORPGs or multi-user domain games (MUDS), allow the user to create an online self through which they can interact with others in the game (Ng 2005). In games such as these, a player can make friends, have conversations and work in teams to achieve goals. These characteristics can be considered risk factors for IGD, as their socially interactive nature and 'alternate world' experience can lead the user to retreat into the virtual world (Ng 2005; Müller 2015). The social aspect of a game can also mean that players are encouraged to continue playing under the pressure of their online peers (King 2018). This pressure can lead to extensive periods of gameplay, in which players may become less able to regulate the time spent playing – a key risk factor for IGD (Cheng 2018).

MMPORGs also often include narrative and identity features such as storytelling, and the ability to design one's own avatar. When a player can design the appearance and traits of their avatar, and then make decisions that will guide them through a story, they are able to create a bond and sense of identity with their avatar. This attachment can encourage the player to invest further in gameplay, to ensure that their avatar succeeds, often extending their playing periods (King 2010). In fact, MMORPGs and first-person shooter (FPS) games have been found to be the most addictive among all game genres. This is attributable in part to the fact that both these genres include games with strong social, narrative and reward components (Na 2017).

Elsewhere, reward and punishment features, and the ways in which they are dispersed through a game, can be captivating for the player. For example, finding rare objects or levelling up through the game creates a sense of reward and progression that encourage users to continue playing until they reach the next goal (King 2018). Game designers strategically place reward features intermittently throughout a game to encourage persistent gameplay, as the player is always working towards their next reward (Griffiths 2017). The relatively recent introduction of 'loot boxes' adds another dimension to the reward feature (Box 3). Punishment features in a game, such as losing a life or getting points deducted, may have a similar effect on the player, as they are motivated to earn back what has been taken from them (King 2010). For players with low self-esteem, self-efficacy or confidence, feeling rewarded from their gameplay efforts may encourage them to play more, hence further increasing their susceptibility to IGD (Müller 2015). This demonstrates how risk factors for IGD can interact and overlap and result in an even higher risk for the disorder.

BOX 3 Loot boxes

Although the contemporary understanding of gaming has evolved away from gambling, the emerging (and increasingly popular) feature of 'loot boxes' in online gaming is blurring the lines between gaming and gambling once again (Drummond 2020). Players purchasing loot boxes within online games is analogous to gamblers playing the slot machines – the player bets money on a chance to win in-game rewards without relying on any skill or strategy. The emerging evidence on loot boxes points towards outcomes and patterns in online gamers that are identical to gambling. This may present a complex situation to clinicians where problem gaming may coexist with problem gambling in some individuals.

Another game-related feature that may be considered as influencing an individual's excessive gameplay is the ability to manipulate or control their play. The user interface, which involves the way a user plays the game, e.g. by means of a computer keyboard or a hand-held device, provides the user with an entirely new system to learn and master. A player's excessive gameplay has been recognised as synonymous with their obsession to 'master' a user interface, for example by learning all of the codes and combinations of a handheld control device in order to reap the best game outcomes (Griffiths 2017). There are aspects of games that a user cannot control, such as loading screens, narrative scripts and waiting periods, and that cannot be skipped. These features automatically extend the length of playing time, often without the player even realising. King et al (2010) suggest that, by dispersing these lower-attention requiring features throughout a game, the player is able to remain more engaged for longer periods. In fact, they can even utilise waiting times to do tasks they would otherwise have to stop their gameplay for, such as eating or using the lavatory.

Finally, the presentation of the game itself should be considered. Exciting, high-definition visuals are appealing as they help the player immerse themselves in the game. To add to this, sound use in games allows the player to create associations between certain sounds or music and particular emotions (King 2010). Identifying feelings of achievement or reward with a sound they hear when they succeed can lead a player, especially one with an unmet need for positive reinforcement, to play excessively in order to reap such positive emotional feelings. Elsewhere, explicit game content, 'real-life' product placement and even the ways in which the game is branded to the public are enticing and influential to a player (Griffiths 2017).

BOX 4 Case vignette: Raul

Raul is a 14-year-old boy. He was doing very well in class until last year, when his grades started to drop. His interest in academic and extracurricular activities reduced, and he started to isolate himself. Over time, Raul completely isolated himself from his friends and family, and would spend hours alone in his room. When his parents confronted him about this, he would become aggressive and defensive. Raul's parents attempted to encourage him to take part in his previous extracurricular activities and to see his friends, but Raul would find excuses and avoid spending much time outside of his room.

Initially, his parents brought him to an ophthalmology department with complaints of dry eyes, worsening short sight and frequent headaches. He was also getting increasingly irritable, bad tempered and disobedient at school and at home. Subsequently, on being assessed by a psychiatrist, it became evident that he was spending much of his time every night playing video games online. He would retire to his room as often as possible and then play games online, often staying awake late at night to play.

After learning how long their son was playing online games for each day, Raul's parents decided to take away his gaming devices each evening before he went to bed. With limited access to his games, Raul began lashing out at his parents and demanding he have access to the games. He would steal his gaming devices from his parents and continue to play each night, despite the impact it was having on his school performance and friendships. When Raul's parents confronted him about his continued gameplay, he would become aggressive and argue that the games were his only escape from school pressure.

With fear that his excessive gameplay was beginning to have negative impacts on Raul's health and school performance, his parents decided to seek treatment for him with a psychiatrist. Raul underwent 12 weeks of cognitive–behavioural therapy to combat his preoccupation with his online games. Over the 12 weeks, Raul's mood and behaviour improved, and he no longer craved playing his games all the time. Instead, Raul decided to invest more time into sports as a stress reliever from his academic studies. After his treatment, Raul's parents no longer had to take his gaming devices away from him, as he was able to better self-regulate the amount of time he spend gaming online.

The neurobiological basis of IGD

One of the ways of understanding IGD is by examining its underlying neurobiology. By comparing the brain circuits of people who are considered addicted to gaming with those who are not, it has been possible for researchers to create a neurobiological profile of the condition, including the regions of cognition, emotion and behaviour that are activated in the condition.

A recent systematic review included 27 studies from different parts of the world (primarily East Asia and Europe) that had used a variety of neuroimaging methods to assess the neurobiological mechanisms of IGD (Kuss 2018). The methods used were functional magnetic resonance imaging (fMRI), resting-state functional magnetic resonance imaging (rsfMRI), voxel-based morphometry (VBM), positron emission tomography (PET) and electroencephalography (EEG).

It was found that differences existed between the neurobiology of healthy gamers and those with IGD in a few key domains. Gamers with IGD were found to have lower activity in the bilateral middle and inferior temporal gyri, indicating impaired visual and auditory functioning (Ding 2014). Further, gamers with IGD were found to have poorer emotion regulation and cognitive control (Xing 2014) and experienced impaired response-inhibition and decision-making ability compared with gamers who did not have IGD. Additionally, impairments were identified in the functioning of their prefrontal cortex (Ding 2014). Most telling was the fact that gamers with IGD displayed a deficiency in their neuronal reward system, which is also found in people who experience substance addictions and non-substance addictions such as gambling. This suggests that IGD could be an addiction syndrome (Spechler 2016).

Another study found a high prevalence of two specific polymorphisms of the dopaminergic system (the Taq1A1 allele of the dopamine D_2 receptor and Val158Met in the catecholamine-*O*-methyltransferase gene) in those addicted to gaming (Han 2007). Similarly, higher prevalences are found in substance addicts, and could indicate that there might be a genetic component to internet game addiction.

Clinical characteristics of persons with IGD

Although there is evidence to indicate that excessive gaming behaviour can have clinically significant consequences (Kuss 2012), there is no consensus on methods of assessment, diagnosis and treatment of the condition. Clinical studies differ in how they have opted to conceptualise, identify and measure IGD. The clinical characteristics of the condition, especially in treatment-seeking populations, have been examined by a limited number of studies.

Before describing this literature, it is worthwhile acknowledging that, because IGD is currently termed a 'potential' clinical condition by DSM-5, and ICD-11 does not come into effect until 2022, an individual cannot yet be 'diagnosed' with the condition. Hence, in the absence of clear clinical guidelines, clinicians need to proceed with caution and sensitivity while working with individuals experiencing mental health problems as a result of their gaming behaviours.

Some of the DSM-5 criteria can be recognised in the case vignette described in Box 4 (the case vignettes in this article are fictitious). On the other hand, ICD-11 has attempted to conceptualise IGD on a spectrum similar to the one used in diagnosing

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alcohol-use disorders, using two mutually exclusive diagnoses: 'gaming disorder' and 'hazardous gaming behaviour' (Box 5). Hence, ICD-11 categorises those with 'risky' gaming behaviour (before it becomes a disorder) as showing 'hazardous gaming behaviour'; once the risk translates into actual harm, the categorisation changes to 'gaming disorder'. At present, no diagnostic tools exist for this classification.

Symptoms of IGD

A systematic review by Paulus et al (2018) indicated that symptoms most typically associated with people experiencing IGD-like behaviours include increased screen time, preoccupation with gaming, increased tolerance for long gaming hours, impaired control over gaming behaviour, internal conflicts related to gaming behaviour ('conflictuousness'), increased importance given to gaming in one's life (salience), feelings of depression and guilt when faced with consequences of gaming, and relapse to gaming behaviour after a brief period of abstinence (Kuss 2012). Other studies have indicated that persons with IGD display emotional instability, shyness, low self-esteem, maladaptive coping behaviours and loneliness (Torres-Rodríguez 2018). Another study found that individuals with video game addiction have lower school performance and social competence compared with their peers (Gentile 2011). King et al have emphasised that behaviours at the core of problematic gaming are impaired control over gaming behaviour, 'conflictuousness' and withdrawal (King 2013a), although there is no general consensus about this (Kuss 2017).

Anxiety disorders, depression, suicidal ideation, ADHD, social phobia, autism spectrum disorder and personality disorders have all been found to be associated with IGD symptoms (Gentile 2011; Torres-Rodríguez 2018).

BOX 5 ICD-11 definition of hazardous gaming

'Hazardous gaming refers to a pattern of gaming, either online or offline that appreciably increases the risk of harmful physical or mental health consequences to the individual or to others around this individual. The increased risk may be from the frequency of gaming, from the amount of time spent on these activities, from the neglect of other activities and priorities, from risky behaviours associated with gaming or its context, from the adverse consequences of gaming, or from the combination of these. The pattern of gaming often persists in spite of awareness of increased risk of harm to the individual or to others.'

(From section on 'Problems associated with health behaviours', World Health Organization 2018b)

BOX 6 Case vignette: Jemima

Jemima is a 28-year-old woman. She lives with a roommate in a small flat and, until recently, she was working full time as a legal secretary. Jemima was always extremely hard working and excelled in her career. She was also in a long-term relationship, until her boyfriend broke up with her 4 months ago. Jemima used to be outgoing and sociable, but after her break-up, she began spending increasingly more time alone in her room. Her roommate would often hear Jemima awake until the early hours of the morning, and when she asked Jemima what she was doing, she learned that Jemima had begun online gaming.

As time progressed, Jemima began playing online games for longer, and would often get no sleep because she was playing games all night. Her tiredness at work started to affect her performance, and soon after, her boss decided to fire her. With no job, Jemima began playing games online all day, and would rarely leave her bedroom. Her roommate became very concerned for her well-being, so decided to confront Jemima. Jemima explained that she started gaming because she was feeling unconfident and depressed after her break-up. Through gaming, she could chat with people online and connect with other people who were also feeling lonely. After playing for some time, she became more invested in the game than in her real life, and after losing her job, she completely retreated into the virtual world.

Jemima's roommate decided to speak to Jemima's parents, who were living in another city. When her parents learned of Jemima's game-playing, they came to visit her immediately. After some time, Jemima began opening up to her parents. She then agreed to visit a counsellor to seek help for her depression, low self-esteem and excessive game-playing.

The case vignette in Box 6 shows how some symptoms progress over time. A clear shift can be seen in the individual's priorities. Her focus shifts from her job to online gaming, with subsequent detriment to her career. This displays how salience can present in someone with IGD. In addition, the vignette highlights how the individual's tolerance for time spent gaming increases over time, to the point where gaming becomes the activity to which the majority of her time is devoted.

Screening and issues with diagnosis

Before DSM-5 was published, there were several scales available for screening for IGD, although they differed significantly in their conceptualisation of the condition, the aspects of the condition being captured and the terminology used. Since the inclusion of internet gaming disorder and gaming disorder in DSM-5 and ICD-11 respectively, many screening tools that use or reference these diagnostic criteria have been developed. A recent systematic review evaluated 32 such tools for internet gaming disorder and gaming disorder, drawn from 320 studies conducted with 9- to 18-year-olds, primarily across Europe and East Asia (King 2020). The review found that the criteria most commonly used by screening tools were impaired control over gaming behaviours and loss of a significant relationship or school or work opportunity due to gaming behaviour. The authors point out that the evidence base for most of these tools is limited, but also

highlight the relative strengths and applications of each tool, so that clinicians and academics can make informed decisions. For instance, clinicians looking for tools that have high coverage of the DSM-5 criteria can use the nine-item Internet Gaming Disorder Scale–Short Form (IGDS9-SF) and the ten-item Internet Gaming Disorder Test (IGDT-10), both of which are based on the DSM-5 criteria, but must be mindful of the fact that the tools have only been tested on convenience samples so far. Nearly half of the tools evaluated were tested with children and adolescents. Clinicians looking to screen adults can choose between most of 32 tools, although the Behavioral Addiction Measure for Video Gaming (BAM-VG) has been tested only on adults (King 2020).

Comorbidities

As already mentioned, individuals who show symptoms consistent with IGD have been found to have psychiatric comorbidity with conditions such as depression, anxiety, autism spectrum disorder, ADHD, obsessive–compulsive disorder and conduct disorder (van Rooij 2014; Müller 2015; King 2016). ADHD has found to be associated with IGD as both a risk factor and a comorbid condition. Many manifestations of the bidirectional relationship between IGD and features of ADHD (inattention and impulsivity) exist – excessive gaming has been found to help adolescents with ADHD cope with their symptoms (Stavropoulos 2019). In some studies, younger players with gaming disorder symptoms have been found to have higher impulsivity scores, whereas in others, higher impulsivity scores have predicted the development of IGD (Stavropoulos 2019). Other studies have linked inattention to the development of IGD among adolescent players. Among older players with IGD, depression, anxiety and substance use have been found to be typical comorbid conditions (Yen 2007; Yen et al., 2007). As can be seen in Box 6, it is likely that Jemima developed depressive symptoms after her break-up which became exacerbated by her problem gaming, and that the clinician she consults would have to consider responding to her depression first.

Evidence-based treatments

Despite the ongoing debate over the definition and diagnostic criteria for IGD as described above, a range of treatments and interventions have been developed globally to treat the disorder. We found two recent systematic reviews of IGD treatments (King 2017; Zajac 2017) (both in fact looked at both internet gaming disorder and internet addiction). King et al (2017) included 30 treatment studies and Zajac et al (2017) included 26. Some studies were included in both reviews and, allowing for these overlaps, this leaves 37 unique studies examined in the two reviews (Fig. 1). These systematic reviews comprise the most comprehensive analyses so far of global treatment studies for IGD, and therefore will be referred to throughout this section.

As stated, both reviews considered treatment studies for both internet gaming disorder and internet addiction; for example, of the 30 studies examined in King et al (2017), 22 were for 'internet addiction', as can be seen in Fig. 1. This is especially the case with earlier studies, which took place before internet gaming disorder had been conceptualised in DSM-5. These studies have been included despite not directly referencing internet gaming, as the term 'internet addiction' has been used to denote a range of internet-related disorders, including internet gaming-related problems. For this reason there is a lack of clarity between treatments directed at IGD and those aiming to treat a range of pathological internet use problems, including IGD. Therefore, treatments for 'internet addiction' will also be considered in this section, with attention paid to their eligibility in relation to online gaming.

Types of treatment

A range of different treatment methods were employed in the 37 studies. Over half of the studies used a psychological or counselling approach. The most common approach was cognitive–behavioural therapy (CBT), but other approaches included virtual reality training (VRT), psychotherapy and family counselling. In addition, 7 studies utilised a pharmacological approach, treating with both antidepressant and psychostimulant drugs such as bupropion, escitalopram and methylphenidate (Kim 2012). Some less evidence-based methods were also used, such as keeping a daily journal and electroacupuncture.

Over half of the 37 studies were from East Asian countries such as China and South Korea, with the remainder from the USA, Brazil, India, Switzerland, Norway and Germany (King 2017; Zajac 2017).

CBT has not been found to be significantly effective in responding to the typical comorbid psychiatric conditions, leading researchers to suggest that clinicians adopt an integrative approach that caters to the comorbidities (Torres-Rodríguez 2018).

Limitations of the current evidence base on treatments

In both King et al (2017) and Zajac et al (2017), the authors identified a range of limitations to the treatment studies they analysed, finding limited

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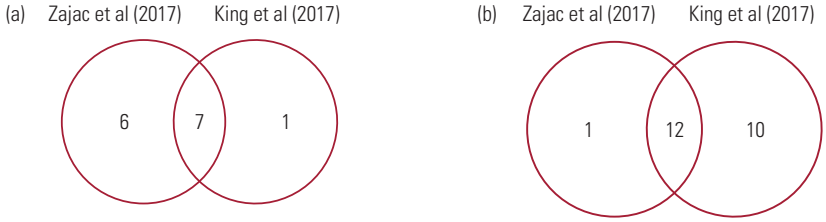

FIG 1 A comparison of treatment study literature from King et al (2017) and Zajac et al (2017), showing the overlap of the 37 unique treatment studies examined in the two reviews. (a) Studies on internet gaming disorder. (b) Studies on internet addiction.

reliability for the studies to be used as evidence bases for future treatments. As there is no agreed definition of IGD, both systematic reviews highlighted a lack of consistency in the definition, diagnosis and measurement of either internet gaming disorder or internet addiction. For instance, the studies utilised a range of diagnostic instruments (including the Internet Addiction Test (IAT), Young's Diagnostic Questionnaire (YDQ) and the Korean Internet Addiction Scale (K-IAS) (King 2017)) and hence the comparability between the people identified with IGD is suspect. Even among the studies dated after the 2013 DSM-5 definition of internet gaming disorder, only one (Sakuma 2017) employed the DSM-5 criteria as their assessment tool.

In addition, both reviews acknowledged key methodological limitations within the studies, such as a lack of randomisation and control groups, a lack of masking ('blinding') and small sample sizes (King 2017; Zajac 2017). There were also concerns that follow-up periods were uniformly short, with a lack of long-term follow-up assessments (Zajac 2017; King 2017), making it impossible to understand the sustained effect of the interventions on the 'treated' participants, a limitation that has been widely acknowledged (King 2018).

Emerging evidence on treatment

As stated above, studies utilising CBT either independently or as part of a treatment package were the most common. This is not surprising given the huge popularity of CBT approaches generally, and especially within addictions studies. According to the cognitive–behavioural model of IGD, those with the disorder are more likely to show signs of impaired cognitive control and flexibility, and increased impulsivity (Sakuma 2017). Treatment studies using CBT do so on the assumption that it will help patients improve in these areas (Sakuma 2017). The case vignette in Box 4 demonstrates the use of CBT as a treatment for IGD. The boy undergoes 12 sessions, after which his craving for gaming is observed to have reduced, and his mood and behaviour have reportedly improved. Despite reports of the successful use of CBT to treat IGD and the overall popularity of the method, the evidence base has several methodological limitations, and the interventions used are poorly described (King 2017; Zajac 2017).

Despite the array of treatment studies for IGD, there is a clear need for improved study designs and more consistency in the diagnostic and measurement tools for the disorder. Additionally, the most popular treatment method, CBT, requires both far clearer explanations of exactly what is being provided under the heading of 'a CBT approach' and far more rigorous evaluations of its effectiveness.

Future directions

We have attempted to summarise here the state of the current literature related to IGD. This has uncovered some clear conceptual debates over the status of IGD as an addiction disorder, as well as gaps in the existing evidence. Practitioners need to actively acknowledge the current contradictions and debates over IGD and its diagnosis and treatment, while at the same time attempting to provide help to those with severe problems with their use of internet and other gaming. We have highlighted the key areas in which caution should be applied and indicated how to interpret risk factors for IGD, particularly as regards comorbidities such as ADHD, anxiety and depression. Overall, practitioners treating IGD must be responsive and responsible in relation to the distress that patients and families might be going through.

Future directions for IGD research must take into consideration the key issues that have been discussed in this review. In particular, attention must be paid to the quality of study designs, especially in treatment studies. Researchers must attempt to approach screening and diagnosis with uniformity and should ensure that their follow-up periods are sufficient to reliably contribute to the evidence base for treating IGD. Ultimately, the goal of future research into IGD should be to develop conclusive evidence on the conceptualisation of the disorder.

MCQ answers
1 c 2 d 3 b 4 b 5 e

Conclusions

Gaming is an immensely popular recreational activity among males and females of all ages worldwide. Playing online video games is an immersive experience that can potentially take over the player's life. When an individual plays such games to the point where they are no longer in control of their behaviour and their daily routine, it has become known as internet gaming disorder (IGD). The aim of our review has been to synthesise and present the best current understanding of the conceptualisation, epidemiology, clinical features and treatment of IGD. The inclusion of 'internet gaming disorder' in DSM-5 and of 'gaming disorder' in ICD-11 has stimulated interest among clinicians and researchers. Although conceptual ambiguity limits unequivocal interpretations, certain conclusions can be drawn about IGD: it has an estimated prevalence of 1% in the global population, there is a greater prevalence among males and among adolescents of both genders and, finally, those in East Asia are more at risk of developing this condition. Several individual, external and game-related risk factors have also been consistently associated with IGD. We end with a call for immediate further research into the comorbidity, diagnosis and treatment of IGD.

Author contributions

D.G. wrote three sections of the article, responded to all reviewer comments and coordinated with all co-authors on compiling edits and responding to feedback. L.B.-L. wrote three sections of the article and responded to the first round of reviewer comments. R.V. provided detailed feedback on sections of the article and resolved some conceptual issues related to the subject matter. S.G. was commissioned by the journal to write the article and provided detailed feedback on the article sections. A. N. was the mentoring author, and provided detailed feedback on the article sections and highlighted latest developments in addictions research to be incorporated into the article.

Declaration of interest

None.

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MCQs

Select the single best option for each question stem

1 Much of what is understood about IGD is drawn from literature on:
- a obsessive–compulsive disorder
- b bipolar disorder
- c substance use disorders
- d depression
- e ADHD.

2 According to current global literature, people at highest risk for developing IGD live in:
- a North America
- b Europe
- c Australasia
- d East Asia
- e South Asia.

3 The strongest risk factor for IGD is thought to be:
- a cognitive functionalities
- b psychopathologies
- c individual factors
- d social interactions
- e external factors.

4 Fill in the blanks: 'DSM-5 requires the patient to meet ____ or more of nine criteria in a ____ month period':
- a three, six
- b five, twelve
- c five, six
- d six, six
- e six, twelve.

5 Which of the following has not been stated as a limitation to the reliability of current IGD treatment studies?
- a short follow-up periods
- b lack of control groups
- c use of varying diagnostic criteria
- d lack of conceptual clarity of IGD
- e poor delivery of treatment.