



The cognitive psychology of Internet gaming disorder



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HIGHLIGHTS

- We review 36 studies on Internet gaming disorder cognition.
- IGD treatment studies employing CT tend to lack cognition-based measures.
- Four types of cognition may underlie Internet gaming disorder.
- Implications for criterion A of DSM-5 Internet gaming disorder are discussed.
- We outline areas for future research on Internet gaming disorder.

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ABSTRACT

Internet gaming disorder (IGD) has received nomenclatural recognition as a potential mental health disorder, despite evident variability in its core psychopathology and psychometric assessment. Although cognitive-behavioural therapy (CBT) is considered an efficacious treatment for IGD, the underlying cognitions of the disorder are not well understood. This review aimed to synthesise research evidence on Internet gaming cognition toward identification of cognitive factors underlying IGD. A systematic review of 29 quantitative studies on Internet gaming cognition and 7 treatment studies employing cognitive therapy for IGD was conducted. Four cognitive factors underlying IGD were identified. Factors included (a) *beliefs about game reward value and tangibility*, (b) *maladaptive and inflexible rules about gaming behaviour*, (c) *over-reliance on gaming to meet self-esteem needs*, and (d) *gaming as a method of gaining social acceptance*. It is proposed that IGD-related cognition may be more complex than “preoccupation” (i.e., criterion A of IGD). IGD cognition may involve the persistent overvaluation of video gaming rewards, activities, and identities, combined with a need to adhere to maladaptive rules governing use and completion of video games. Greater understanding of the proposed cognitive factors may advance clinical research agendas on identification of individuals with IGD, as well as the expansion and improvement of cognitive therapies for the disorder.

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1. Introduction

Psychological problems associated with Internet gaming are increasingly recognised as a global problem (Ferguson, Coulson, & Barnett, 2011; King, Delfabbro, Zwaans, & Kaptis, 2013; Kuss & Griffiths, 2012; Mentzoni, Brunborg, Molde, Myrseth, Skouevør, Hetland, et al., 2011; Van Rooij, Schoenmakers, Vermulst, van de Eijnden, & van de Mheen, 2010). In May 2013, Internet gaming disorder (IGD) was included in Section III of the DSM-5 as a condition warranting further study (American Psychiatric Association, 2013). This marked the first occasion of Internet gaming being formally recognised as a mental health disorder, albeit tentatively, in psychiatric nomenclature. The IGD classification is most similar in nature to pathological gambling (or “gambling disorder” in the DSM-5) and contains nine criteria: (A) preoccupation with Internet games; (B) withdrawal symptoms when Internet gaming is taken away; (C) tolerance, the need to spend increasing amounts of time engaged in Internet gaming; (D) unsuccessful attempts to control participation in Internet gaming; (E) loss of interest in hobbies and entertainment as a result of, and with the exception of, Internet gaming; (F) continued excessive use of Internet games despite knowledge of psychosocial problems; (G) deception of family members, therapists, or others regarding the amount of Internet gaming; (H) use of Internet gaming to escape or relieve a negative mood; and (I) loss of a significant relationship, job, or educational or career opportunity because of participation in Internet games.

Research on IGD, also referred to as “video game addiction” or “pathological video gaming,” has long been characterised by inconsistencies in terminology, definition, and assessment (King & Delfabbro, 2013a; Sim, Gentile, Bricolo, Serpollini, & Gulamoydeen, 2012). For example, a systematic review by King, Haagsma, Delfabbro, Gradisar, and Griffiths (2013) reported that, across 18 assessment tools employed in 63 studies of online pathological video gaming, no two measures were alike in their conceptualisation and ability to “map out” diagnostic features. Although the IGD criteria are not necessarily finalised, one advantage of the IGD classification is it may lead to a greater degree of standardisation in the assessment of the disorder than was previously the case. A standardised approach affords multiple benefits, such as improvements in comparability of prevalence rates and general findings across studies, as well as identification of at-risk populations in the community. An eventual consensus on the definition of IGD may also enable more accurate diagnosis of clinical cases and assessment of outcomes at follow-up in clinical trials. However, one potential risk of premature acceptance of the new addiction model-based classification for IGD is that it may restrict further theoretical or conceptual development of the disorder. For example, concerns have previously been raised about the appropriateness of directly adapting pathological gambling criteria to Internet-based behaviours (Błaszczynski, 2006). Along a similar line, it has been argued that, rather than existing as its own clinical

diagnosis, excessive Internet gaming behaviours, like other addictive behaviours including substance use and gambling, may be better classified as reward deficiency syndrome (RDS), a condition characterised by an abnormal dopaminergic function in the nucleus accumbens (Blum, Chen, Chen, Braverman, Reinking, Blum, et al., 2008; Lee, 2004). It has also been argued that a deeper consideration of the problematic social and cognitive-behavioural processes specific to Internet gaming may refine the formulation of IGD (Allison, von Wahlde, Shockley, & Gabbard, 2006; Caplan, 2010; King, Delfabbro, Griffiths, & Gradisar, 2012). Finally, it has been argued that gaming does not always occur online, and this should be reflected in the terminology of the disorder (King & Delfabbro, 2013a).

1.1. Beyond preoccupation: Identifying core cognitions of IGD

A key area of refinement in the IGD classification concerns the criterion of cognitive salience or “preoccupation” (King & Delfabbro, in press; Shapira, Lessig, Goldsmith, Szabo, Lazoritz, Gold, et al., 2003). According to King, Haagsma, Delfabbro, Gradisar, and Griffiths (2013), the majority (i.e., 14 out of 18) of current assessment tools for IGD assess this criterion. However, some research has suggested that this indicator may lack clinical validity because it does not readily distinguish between normal and problematic Internet gamers (Charlton, 2002; Charlton & Danforth, 2007). One explanation is that current approaches to measurement of this indicator are not adequately worded (e.g., lack of qualifying information, or tendency to elicit a false interpretation) or lack a scale of severity to measure a clinical subtype of preoccupation. Another possibility is that adhering to a broad definition of preoccupation (i.e., thinking about Internet games and planning the next session of play) may overlook specific problematic beliefs about Internet gaming. For example, many people report having daily thoughts about their body shape and/or appearance, whereas only individuals with diagnosed anorexia nervosa will report significantly distorted thinking about body image and a pathological fear of gaining weight. Similarly, regular gamblers may report a frequent tendency to think about and plan gambling sessions, whereas pathological gamblers will report irrational beliefs related to the long-term profitability and degree of player control involved in gambling. Following this reasoning, it may be argued that individuals who experience IGD may endorse a similarly idiosyncratic set of maladaptive beliefs that underlie persistent and excessive involvement in Internet gaming activities. The purpose of this review, therefore, was to identify and assess the content and structure of these beliefs pertinent to Internet gaming.

1.2. Cognitive-behavioural models of Internet gaming disorder

The most frequently cited cognitive-behavioural conceptualisation of relevance to IGD is Davis (2001) model of generalised problematic

Internet use. Davis (2001) model suggests that pathological Internet use results from “problematic cognitions coupled with behaviours that either intensify or maintain the maladaptive response” (p.191). Maladaptive cognitions include two main subtypes: (Adin & Sari, 2011) thoughts about the self and (Allison et al., 2006) thoughts about the world. Thoughts about the self include self-doubt, low self-efficacy, and negative self-appraisal. In basic terms, the individual has a negative view of his or herself and uses the Internet to achieve positive social interaction and feedback from others. Cognitions about the self may include such thoughts as, “I am only good on the Internet” or “I am worthless offline, but online I am someone.” Cognitive distortions about the world involve generalising specific events to global trends. These may include thoughts such as “The Internet is the only place I can feel safe” or “Nobody loves me offline.” These two cognitive distortions are triggered by stimuli associated with the Internet, and maintain excessive behavioural patterns of Internet use.

An alternative but similar model by Caplan (2010) has proposed two cognitive features of pathological Internet use. These features include (Adin & Sari, 2011) *preference for online social interaction* (POSI), defined as the belief that one is safer, more efficacious, more confident, and more comfortable with online interpersonal interactions and relationships than with face-to-face social activities, and (Allison et al., 2006) *preoccupation*, defined as obsessive thought patterns concerning Internet use. POSI was proposed as an extension of Davis (2001) cognitive distortions about the self. This notion that the Internet enables an individual to fulfil basic well-being and social needs has been advanced several times previously in the literature. For example, a recent (non-clinical) motivational model of video gaming by Przybylski, Rigby, and Ryan (2010) suggests that the appeal of video games is based on their potential to satisfy basic psychological needs for competence, autonomy, and relatedness. Similarly, Lortie and Guittou (2013) and Charlton and Danforth (2007) have identified social motivations underlying Internet use as potentially clinically relevant. In summary, although prevailing cognitive models of Internet use are useful in conceptualising the negative core beliefs among general Internet users (see King, Delfabbro, & Griffiths, 2012), primarily these models are quite speculative in nature and very limited in their reference to cognitions specific to video gaming activities.

1.3. The present study

The first aim of this review was to summarise and critique available empirical and treatment evidence on the cognitive processes of IGD. The second aim was to attempt to synthesise this knowledge base toward identification of a common set of cognitions that may underlie IGD. Although several recent reviews of the Internet video gaming literature have highlighted limitations in regard to etiology and risk factors (Kuss & Griffiths, 2012), differences in prevalence rates (Ferguson et al., 2011), consistency of assessment (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013), and quality of intervention studies (King, Delfabbro, Griffiths, & Gradisar, 2011), this review is unique due to its focus on cognition. No previous reviews have focussed specifically on evaluating Internet gaming cognition. Therefore, this review was intended to aid in the conceptual development of IGD and guide future research and treatment in this area. It was intended that this review would promote the development and refinement of cognitive therapy-based approaches to IGD, and extend the debate on the core psychopathology of the emerging disorder.

2. Method

2.1. Study selection

A computer database search of *Academic Search Premier*, *PubMed*, *PsychINFO*, *ScienceDirect*, *Web of Science*, and *Google Scholar* was conducted, using the following search terms and logic: “(patholog* OR

problem* OR addict* OR compulsive OR dependen*) AND (video OR computer) gam* AND cognit*.” All searches were limited to full text papers published from 2000 to 2013 because studies conducted in this era of “Internet gaming”¹ are most relevant to the DSM-5 category of IGD. These database search parameters yielded a total of 1,640 hits, which included the following results in each database: *Academic Search Premier* (242 results), *PubMed* (13 results), *PsychINFO* (301 results), *ScienceDirect* (264 results), and *Web of Science* (820 results). The reference lists of systematic reviews of pathological online video gaming were also examined (i.e., Ferguson et al., 2011; King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013; Kuss & Griffiths, 2012; Sim et al., 2012; Winkler, Dörsing, Rief, Shen, & Glombiewski, 2013), as well as the references of the included studies. Given the large number of results on *Google Scholar* (over 15,000 results), only the first 30 pages of results were examined.

Studies were selected on the basis of containing either (Adin & Sari, 2011) a quantitative investigation of the cognitive processes underlying IGD or (Allison et al., 2006) a treatment study of IGD employing a CT or CBT component. Because the purpose of this study was to identify all available research evidence on Internet gaming cognition, studies were not necessarily excluded on the basis of methodological shortcomings such as low sample size or lack of a control group. However, studies were excluded if they contained only case note material or anecdotal evidence, or referred only to cognitive training applications of gaming (e.g., rehabilitation or education). Additionally, studies which referred only to general Internet use (i.e., no specific reference to gaming) were not considered for inclusion. A total of 29 quantitative studies and 7 treatment studies were identified for selection by this process of review.

2.2. Study assessment

The primary purpose of the review was to identify cognitions (i.e., beliefs and assumptions) specific to IGD. Given the current lack of an evidence-based conceptualisation of IGD cognition, an initial review framework was developed by adapting the standard cognitive conceptualisation, as proposed by Beck (1976) and subsequently refined by Beck and Weishaar (1992) and Beck (2011). This cognitive conceptualisation considers *core beliefs* and *conditional assumptions* underlying behaviour. By adapting Beck's (1976) *cognitive triad* in order to include Internet gaming, the first step of the review was to identify all cognitions among individuals with IGD that are related to the following: (1) the self, (2) Internet gaming, (3) other people, the world, and the future. All included studies (N = 36) were assessed and coded so that all information related to these types of cognition could be extracted. The coding method involved each reviewer reading the identified studies and highlighting and coding all relevant information. Only material with a supporting empirical base (e.g., cognition measured by a psychometric instrument) was extracted. All 36 studies contained material relevant to at least one category, and an initial list of 58 cognitions was compiled (see Table 2).

The second step was to organise and refine the compiled material to account for differences in the content and structure of cognitions within each broad category of the cognitive triad (e.g., *beliefs/assumptions related to the self*). It was then reasoned that there was sufficiently high variability in content within each category to warrant subcategories. Therefore, all cognitions with the same or similar content or meaning were grouped together. For example, the cognitions of “gaming items have exaggerated value” and “attribution of high value to games” were judged to be sufficiently similar because the two cognitions referred to a core belief about the value of gaming. This category was

¹ From 1999, video gaming had expanded significantly into the online medium where games could be played as part of a gaming community, with the notable emergence of Massively Multiplayer Online Role Playing Games (MMORPGs) (e.g., *Everquest* [1999], *Ultima Online* [1997], and *Asheron's Call* [1999]) (Griffiths, Kuss, & King, 2012).

then labelled “reward value and tangibility” and placed within Category 2 of the cognitive triad (i.e., beliefs about video gaming). Identified cognitions with fewer than two supporting references were considered to be not sufficiently robust. Two potential cognitions – *perfectionism* and *cognitive regret* – were excluded on this basis. Categorising the list of 56 cognitions using this method yielded a total of 16 distinct cognitions, which included *reward value and tangibility*, *avatar attachment*, *positive and negative expectancy*, *procrastination/prioritisation*, *obsession*, *sunk cost bias*, *behaviour completion*, *rule-setting*, *black-and-white thinking*, *gaming self-esteem*, *beliefs about control*, *vulnerability*, and *achievement*, *social relatedness*, *competition*, *social avoidance*, and *sense of belonging*. The initial three broad categories based on Beck’s cognitive triad (as outlined above) were considered to be lacking specificity in description to accommodate the grouping of cognitions. Hence, as a third step, new factors were proposed that aimed to capture the general similarities of identified cognitions. Beliefs about the self (Category 1) were considered to be related primarily to player self-esteem. Beliefs about Internet gaming (Category 2) were divided into two categories to accommodate two major types of cognitions: those related to video games as objects and those related to rules about video gaming actions. Beliefs about the others, the world, or the future (Category 3) were considered to be related to social acceptance. Therefore, as summarised in Table 2, the final categories included (a) *beliefs about game reward value and tangibility*, (b) *maladaptive and inflexible rules about gaming behaviour*, (c) *over-reliance on gaming to meet self-esteem needs*, and (d) *gaming as a method of gaining social acceptance*.

For validation purposes, all reviewed studies were reanalysed to identify any further material which may be applicable to the review framework, and to ensure that extracted material was consistent with the proposed framework. At each stage of the review, identified characteristics of each study were discussed and systematically entered into a computer database using Microsoft Excel© 2013. Disagreements and/or discrepancies in clinical judgement occurred in the case of naming three cognitions and resolution was reached by consultation and consensus between the two authors.

3. Results

Table 1 presents a summary of key characteristics of the 7 treatment studies on Internet gaming disorder. Although only 3 studies employed CBT-only interventions, all 7 studies contained at least one cognitive therapy module and thus were included for analysis of cognition-related assessment, treatment, and therapy outcomes. It should be noted that all reviewed studies predate the publication of Internet gaming disorder (IGD) in Section III of the DSM-5.

3.1. Cognitive therapy research on IGD

Assessment tools for baseline and outcome measures of (Adin & Sari, 2011) diagnostic status of IGD and (Allison et al., 2006) presence of problematic Internet gaming cognitions were first examined. With regard to diagnosis at baseline, 5 studies (Kim, Han, Lee and Renshaw, 2012; Li & Wang, 2013; Shek, Tang and Lo, 2009; Su, Fang, Miller and Wang, 2011; Young, 2007) employed the Young Internet Addiction Test, or a short version of this measure (e.g., Young Diagnostic Questionnaire). Notably, all 7 studies assessed for the presence of cognitive preoccupation with Internet gaming (i.e., criterion A of DSM-5 IGD). However, only 1 study (Li & Wang, 2013) included an additional psychometric instrument (i.e., the Online Gaming Cognition Scale) to assess for specific problematic cognitions related to Internet gaming (i.e., all-or-nothing thinking, short-term thinking, online comfort). The K-Internet Addiction Scale was described as assessing “automatic thoughts,” but the content of these cognitions was not detailed. A copy of the test manual was not available on the Korean Ministry of Information and Communication Web site, or by formal request.

Cognitive therapy ranged from 8 to 12 sessions in the majority of studies (Du, Jiang and Vance, 2010; Kim, 2008; Kim et al., 2012; Li & Wang, 2013; Young, 2007). The dominant CBT strategy for IGD was the development of a controlled behaviour plan informed by a functional analysis of antecedents and triggers, which was employed in all 7 studies. Other commonly employed cognitive therapy modules included self-monitoring (Du et al., 2010; Kim, 2008; Li & Wang, 2013), challenging or disputing beliefs (Kim et al., 2012; Li & Wang, 2013; Shek et al., 2009; Su et al., 2011), and problem-solving (Du et al., 2010; Kim et al., 2012). Two studies (Du et al., 2010; Kim et al., 2012) included a module to assist clients to improve interpersonal relationships and communication style. Only 1 study (Young, 2007) adopted an abstinence approach to Internet use (i.e., the treatment aim of all other studies was controlled use of the Internet), although treatment in Young’s study was tailored to a range of Internet applications, and not exclusively Internet gaming.

Finally, the method of assessment of therapy outcome was examined. All 7 studies employed their baseline measure of IGD to assess preoccupation. However, a limitation of 6 studies (Du et al., 2010; Kim, 2008; Kim et al., 2012; Shek et al., 2009; Su et al., 2011; Young, 2007) was the failure to report change in the criterion of preoccupation specifically (i.e., the primary cognitive dimension of IGD) from baseline to post-intervention. Hence, it was not possible to assess whether CT or CBT interventions had any benefit on problematic Internet gaming cognition in these studies. However, Li and Wang’s (2013) study included a measure of online gaming cognitions (Online Game Cognitive Addiction Scale: Li, Wang, & Wang, 2008) and a measure of general cognitive distortions (Cognitive Distortions Scale: Li & Wang, 2013). The authors presented an analysis of treatment outcomes for these cognitions from baseline to post-intervention (see Li & Wang, 2013, for a complete discussion). Other general cognition-related measures non-specific to Internet gaming administered post-intervention included life satisfaction (Kim et al., 2012; Su et al., 2011), negative core beliefs (Kim, 2008), valuing of time (Du et al., 2010), anxiety (Kim et al., 2012), and decision-making (Kim, 2008).

3.2. Quantitative research on IGD cognition

General characteristics of the quantitative research evidence base were first assessed. Three general profiles of study participants were identified, including adolescents (N = 9 studies; Table 2 references 1, 3, 10, 11, 12, 20, 22, 27, and 28), university students (N = 9 studies: 4, 5, 7, 13, 14, 15, 18, 19, and 23), and adult-age players of Internet video games (N = 11 studies: 2, 6, 8, 9, 16, 21, 24, 25, 26, and 29). Studies were published in peer-reviewed journals in the categories of cyberpsychology (N = 21; *Computers in Human Behavior*, *CyberPsychology, Behavior & Social Networking*), adolescence (N = 6; *Journal of Adolescence*, *Adolescence, Children and Youth Services Review*), addiction (N = 2; *International Journal of Mental Health and Addiction*, *European Addiction Research*), communication (N = 2; *Asian Journal of Communication*; *Journal of Broadcasting & Electronic Media*), general psychology (N = 1; *British Journal of Psychology*), psychiatry (N = 1; *Australian and New Zealand Journal of Psychiatry*), specialist therapy (N = 1; *International Journal of Reality Therapy*), and education (N = 1; *Computers and Education*). The country of origin for quantitative studies varied greatly, and included the United States (N = 8), United Kingdom (N = 5), China (N = 3), Turkey (N = 3), Taiwan (N = 2), the Netherlands (N = 2), Czech Republic (N = 1), Greece (N = 1), Spain (N = 1), Singapore (N = 1), South Africa (N = 1), and Switzerland (N = 1).

3.3. Four categories of IGD cognition

Table 2 presents a summary of the analysis of the empirical literature (37 studies) on Internet gaming cognition. A total of 16 cognitions underlying IGD were identified. It should be noted that some of these

Table 1
Summary of IGD treatment studies that employ a cognitive therapy component.

Study	IGD assessment tool	N	Participants	Treatment conditions	Cognitive therapy modules	Cognition-related outcomes assessed
Du et al. (2010)	Beard's Diagnostic Questionnaire; Internet Overuse Self-Rating Scale	56	Adolescent patients	1. CBT (8 sessions) 2. Control	1: Self-monitoring; Recognising and controlling feelings; 2: Communication skills; 3: Problem-solving; 4: Dealing with online relationships; 5: Impulse control techniques	1: Preoccupation 2: "Valuing of time"
Kim (2008)	Korean Internet Addiction Scale	25	University students	1. R/T group counselling (10 sessions) 2. Control	1: Reality therapy (self-monitoring); 2: Functional analysis of Internet behaviour; 3: Recognising triggers for Internet use	1: Preoccupation 2: Decision-making 3: Negative core beliefs
Kim et al. (2012)	Young Internet Addiction Scale	65	Adolescent patients	1: CBT (8 sessions) + Bupropion 2: Control	1: Disputing false beliefs, developing alternative beliefs; 2: Problem-solving; 3: Communication skills training; 4: Self-control skill training; 5: Relapse prevention	1: Preoccupation 2: Life satisfaction 3: Anxiety
Li and Wang (2013)	Young Internet Addiction Scale; Online Gaming Cognition Scale	28	Adolescent patients	1: CBT (12 sessions) 2: Control	1: Psycho-education on cognitive distortions; 2: Disputing false beliefs about gaming; 3: Restructuring belief systems; 4: Behaviour plan; 5: Monitoring cognitive distortions during Internet use	1: Rumination 2: All-or-nothing thinking 3: Short-term thinking 4: Online comfort
Shek et al. (2009)	Young Internet Addiction Scale; Composite Internet beliefs measure	59	Adolescent patients	1. Multi-modal counselling (15 to 19 months) 1. Online self-help (1 session) 2. Control	1: Identification of discrepancies between values and online behaviour; 2: Behaviour plan	1: Preoccupation 2: Internet-related attitudes
Su et al. (2011)	Young Diagnostic Questionnaire	65	University students	1. CBT (12 sessions)	1: Adjusting irrational cognitions; 2: Creating an online plan; (3) Resisting Internet temptation; (4) Using reminder cards	1: Preoccupation 2: Life satisfaction
Young (2007)	Young Internet Addiction Test	114	Adult clients	1. CBT (12 sessions)	1: Abstinence from problematic applications; 2: Control strategies; 3: Relapse prevention	1: Preoccupation 2: Motivation to quit

cognitive processes may not be pathological in all forms, and therefore may be reported, to a varying degree, by individuals who simply frequently play Internet games (see, for example, [Charlton & Danforth, 2007](#)). In judging whether these cognitions may be determined pathological, it is recommended that clinicians and researchers take into consideration the relative strength and frequency of activation of each core belief or conditional assumption, the lack of protective cognitions, and associated interference with daily functioning. Each cognitive process is accompanied by an illustrative client statement.

3.3.1. Beliefs about game reward value and tangibility

This category referred to beliefs about the nature of Internet gaming rewards, activities, and identities, and encompassed the standard clinical criterion of preoccupation with Internet gaming (i.e., criterion A of DSM-5 IGD). Specific cognitions in this category included ([Adin & Sari, 2011](#)) *reward value and tangibility*, or the overvaluation of gaming items, rewards, and/or virtual currency such that they are perceived to be tangible and of significantly greater value than all other life activities, including school, employment, self-care, and/or interpersonal relationships; ([Allison et al., 2006](#)) *avatar attachment*, an emotional attachment to one's avatar or online identity such that it is perceived as a friend, intimate partner, or an extension of oneself; and ([American Psychiatric Association, 2013](#)) *obsession*, or the general preoccupation with Internet gaming, associated with constant planning and anticipation of the next Internet gaming session. A total of 13 studies assessed the first two factors. All 36 studies provided empirical support for the fourth factor, given that the fourth cognitive process (obsession) is a diagnostic feature of IGD in the vast majority of assessment tools (see [King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013](#)).

3.3.2. Maladaptive and inflexible rules about gaming behaviour

The second category of cognitions referred to how individuals tended to justify their decisions to continue engaging in Internet gaming despite knowledge of the adverse consequences. In some circumstances, the optimal decision to avoid negative consequences of Internet gaming (e.g., missing work, failure to complete homework, neglect of household duties) would be to cease playing at a particular point in time. However, this often does not happen because the utility of the decision is not based solely on weighing of the advantages and benefits of a particular course of behaviour, but in relation to other behaviours that have been already undertaken or commitments that have already been made. Specific cognitions in this category included (1) *sunk cost bias* (see [Kahneman, 2011](#)), or the justification of continued engagement in Internet gaming based on the large investment of time and effort already committed to the online game; (2) *behaviour completion* (see [Mcconaghy, Armstrong, Blaszczyński, & Alcock, 1988](#)), or the tension that is experienced by the player when there may be a component of delay between initiation of gaming behaviour and delivery of the next game reward; (3) *procrastination/prioritisation*, or the prioritisation of Internet gaming activities over other domains of functioning, or a persistent delay in performing other activities; and (4) *maladaptive rules or decision-making* governing the duration of play and/or achievement of goals in an Internet gaming session. A total of 11 studies were associated with this category of cognition.

3.3.3. Over-reliance on gaming to meet self-esteem needs

The third category referred to negative core beliefs about the self that are compensated for by the player's expectations and experiences related to Internet gaming. Specific cognitions in this category included (1) *gaming self-esteem*, or the use of Internet gaming as the primary means of feeling a personal sense of pride or competence; (2) *expectancy beliefs*, comprising of *positive expectancy*, or the belief that positive feelings may be reliably and/or exclusively obtained by playing Internet games, and *negative expectancy*, or the contrasting belief that negative feelings will tend to accompany a period of absence or cessation of Internet gaming; (3) *belief about control*, or the perception that one will

Table 2
Cognitive factors underlying Internet gaming disorder.

Factor	Cognitions	Supporting research	Illustrative client statements
Beliefs about game rewards	<i>Reward value and tangibility</i>	15: Gaming items have exaggerated value 24/33: Blurring of game and reality, game feels real 24/29/32: Paying real money for video-game items 25: Attribution of high value to games 27: Acquired items, XP, levels as perceived “wealth” 24/27: Theft of players’ valuables	“Rewards in video-games are as real to me as anything else in my life.”
	<i>Avatar attachment</i>	2: Motivation to be immersed in a game avatar 10/16/20/29: Creation of an alternate/ideal identity 19/25/29: Avatar attachment: an actual, tangible feeling of intimacy with an avatar	“When my game character achieves something, I feel like I have achieved that too.”
	<i>Obsession (rumination/planning)</i>	1-36: Cognitive preoccupation 12: Obsessive thinking 4/24: Scheduling life around gaming 33: Rumination about gaming	“I find myself thinking about video-games when I am not playing.” “I often plan or think about the next thing I need to do in a game.”
Maladaptive and inflexible rules about gaming	<i>Sunk cost bias</i>	6: Rationalisation: Justification of cost 17: Time investment of playing 28: Justification of effort spent in game	“It is a waste to not try to complete a game once I have invested my time and energy.” “When I make mistakes or fail in a game, I must reload and try again.”
	<i>Behaviour completion</i>	9: Inability to inhibit gaming response 11: Deficient self-regulation, needing to finish gaming activities	“When I have a goal or objective in a video-game, I must complete it.” “I feel unsatisfied until I have achieved 100% or unlocked everything in a game.”
	<i>Procrastination/Prioritisation Rule-setting (time/completion)</i>	2/26: Persistent delay in performing other activities due to Internet gaming 15/29/32: Impaired decision-making, self-talk: “just a few more minutes” 27: Needing to invest more and more time to obtain rewards	“I always play video-games before doing something else, e.g., homework or chores.” “I tell myself ‘just a few more minutes’ when I play a game, but then play much longer.” “I feel uncomfortable thinking about my unfinished games or objectives.”
Gaming-based self-esteem	<i>Gaming self-esteem</i>	15/33: Sense of worthlessness when offline 1/32: Gaming as compensation for low self-esteem 5/10/21/22/29: Gaming as primary means of feeling competent 27/33: All-or-nothing thinking	“I am proud of my gaming achievements.” “I would be a failure without my gaming.”
	<i>Positive/Negative expectancy</i>	3/4: Belief that positive feelings only possible online 5/7: Game provide reliable hedonic management 10: Happiness, “feeling more alive” when gaming 12/15: Negative expectancies if gaming ceased	“I will feel better after playing video games.” “I would feel bad if I was not able to play video-games.”

(continued on next page)

Table 2 (continued)

Factor	Cognitions	Supporting research	Illustrative client statements
Gaming as a means of gaining social acceptance	<i>Control</i>	10: Gaming meets needs of autonomy 16/29: Feel more powerful in a game than real life 19: Sense of control over character actions	"I feel more in control when I play video-games."
	<i>Vulnerability</i>	1: Prevailing negative view of oneself 11: Sense of vulnerability when offline; safety online 12: Online interaction perceived as safer, less risky	"An Internet game is the only place I feel safe" "I would not cope with stress in my life without video-games."
	<i>Achievement</i>	2/8/16/17: Gaming for individual accomplishment 24: Gaming as means of feeling achieved	"If I complete or master a video-game, I feel good about myself."
	<i>Social relatedness</i>	1/2: Gaming for the social atmosphere 3: Perception that non-gamers unable to relate socially 9: Gaming world ameliorates social anxiety 10/11: Preference for online social interaction 12/21: Lower social competence in real world	"People who do not play video-games do not understand me." "I can only relate to people in the online game."
	<i>Competition</i>	10/29: Power, success, and dominance over opponents	"I become a better than others by beating other game players."
	<i>Social avoidance</i>	2/8/16/17: Motivated to game as an escape 9/20/29: Escaping from uncomfortable feelings 14: Avoidance of relationships and responsibility 10/22: Distraction from pressures or tasks of real world	"Playing video-games protects me from people and situations that make uncomfortable." "Video-games enable me to escape from my problems and responsibilities."
	<i>Sense of acceptance and belonging</i>	2: Gaming provides a sense of community 3/5: Internet is the only place offers social feedback 15: Lack of belonging in the real world 16: Sense of safety in making social contacts online 21/33: Perception of being unloved/unlovable offline 24: Avatar recognition by others	"If I am good at a video-game, players will notice and take me seriously." "Other players admire and respect my gaming achievements."

Research evidence: 1: Adin and Sari (2011); 2: Caplan, Williams, and Yee (2009); 3: Celik and Odaci (2013); 4: Charlton (2002); 5: Charlton and Danforth (2007); 6: Choiu and Wan (2007); 7: Chumbley and Griffiths (2006); 8: Dauriat, Zermatten, Billieux, Thorens, Bondolfi, Zullino, et al. (2011); 9: Decker and Gay (2011); 10: Floros and Siomos (2012); 11: Gamez-Guadix, Villa-George, and Calvete, (2012); 12: Haagsma, Caplan, Peters, and Pieterse (2013); 13: Howard and Magee (2013); 14: Kalkan (2012); 15: Kim and Davis (2009); 16: Kneer and Glock (2013); 17: Kuss, Louws, and Wiers (2012); 18: Lee and LaRose (2007); 19: Lewis, Weber, and Bowman (2008); 20: Li, Liao, and Khoo (2011); 21: Liu and Peng (2009); 22: Mai, Hu, Zhen, Wang, and Zhang (2012); 23: Mehroof and Griffiths (2010); 24: Oggins and Sammis (2012); 25: Smahel, Blinka, and Ledabyl (2008); 26: Thatcher, Wretschko, and Fridjhon (2008); 27: Wan and Chiou (2007); 28: Wan and Chiou (2010); 29: Zhong and Yao (2012); 30: Du, Jiang, and Vance (2010); 31: Kim (2008); 32: Kim, Han, Lee, and Renshaw (2012); 33: Li and Wang (2013); 34: Shek, Tang, and Lo (2009); 35: Su, Fang, Miller, and Wang (2011); 36: Young (2007).

achieve a personal sense of control or autonomy by playing Internet games, often associated with an intolerance of the uncertainty or unpredictability of the real world; (4) *belief about vulnerability*, or the perception that one is only able to feel safe in the online world, which may be associated with a belief that the world is inherently unsafe; and (5) *belief about achievement*, or the belief that Internet gaming enables a profound sense of mastery and personal accomplishment that is regarded as unobtainable in the real world. A total of 21 studies were associated with this category of cognition, which was the highest number of studies across all four factors.

3.3.4. Gaming as a method of gaining social acceptance

The final category referred to the belief that Internet gaming may enable an elevation in social status and a sense of belonging within an online community, whilst avoiding the undesirable aspects of social rules and responsibility in the real world. According to Lewis, Weber and Bowman (2008) and Zhong and Yao (2012), many players report that their online relationships and/or rank or position within virtual social institutions (e.g., “guilds,” “clans,” or “raid parties”) come to be overvalued in relation to real world relationships. As social gaming activities may require an increasingly greater and inflexible investment of time, players may develop a distorted perception of other life activities as peripheral, unsatisfying, and lacking in personal meaning. Specific cognitions in this category include (1) *social relatedness*, or the perception that only people who play video games, and even the same video games, are capable of understanding the individual; (2) *competition*, or the belief that advancement of rank or status in a competitive online environment will fulfil social needs; (3) *social avoidance*, or the belief that video gaming will prevent the individual from being challenged and ultimately protect against experiencing failure in life areas of responsibility; and (4) *sense of belonging*, or the perception that the individual is accepted and belongs within an online community of other players. A total of 20 studies were associated with this category of cognition.

4. Discussion

Internet gaming disorder, currently positioned in the appendix of the DSM-5, is a condition in need of further study and analysis. Extant reviews of the disorder (King, Haagsma, Delfabbro, Gradisar, & Griffiths, 2013; Lortie & Guitton, 2013; Winkler et al., 2013) suggest a need for critical consideration of its current conceptualisation as a step toward development of new research agendas and effective treatment programmes. Although 36 quantitative studies relevant to Internet gaming cognition have been conducted since the year 2000, these findings had not been synthesised to identify cognitive factors underlying IGD. This may be attributed, in part, to the multidisciplinary nature of research on IGD, and particularly the relatively high number of studies published outside of psychiatric and clinical psychology journals. The first aim of this systematic review was therefore to evaluate the status of treatment studies that employ assessment and treatment techniques focused on IGD cognition. The second aim was to summarise all available quantitative evidence on cognitive factors underlying IGD. Overall, the results of this review suggest that IGD-related cognition may involve the process of persistent overvaluation of video gaming rewards, activities, and identities, combined with a need to adhere to maladaptive rules governing use and completion of video games. The four proposed factors are preliminary in nature and warrant further validation, but suggest multiple avenues for original research in this field.

The scope of this review included both treatment and quantitative (i.e., studies employing experimental or survey-based methodologies) studies. Consistent with past reviews of Internet addiction treatment (King et al., 2011; Winkler et al., 2013), it was observed that very few published treatment studies on Internet gaming disorder exist, with only 7 studies that employ cognitive-behavioural approaches. Although this review was not designed to assess limitations and inconsistencies

across studies (e.g., adherence to CONSORT guidelines), several inconsistencies in assessment of treatment outcomes were observed. Two weaknesses of current cognitive-behavioural interventions for IGD were highlighted: (1) a lack of measures to assess cognitions related to Internet gaming aside from general preoccupation with the activity and (2) a failure to report change in the specific criterion of preoccupation (i.e., the primary cognitive dimension of IGD) from baseline to post-intervention. Extant treatment studies have tended to monitor endorsement of Internet gaming disorder criteria, co-morbid psychopathology, and frequency of Internet gaming. This finding suggests that clinical trials employing CBT should consider measurement of changes in the strength and content of beliefs about Internet gaming, in addition to inclusion of broader outcome measures such as the quality of interpersonal relationships, involvement in other hobbies or interests, and life satisfaction (King & Delfabbro, 2013b).

4.1. Integrating cognitive factors with DSM-5 IGD criteria

The results of this review suggest the possibility of an expanded view of criterion A (“preoccupation”) of the IGD classification. Rather than IGD involving persistent and intrusive thoughts of Internet video games (i.e., the current definition), this review suggests that individuals with IGD may hold some unique beliefs about Internet gaming itself. One test for validating the clinical utility of the identified cognitions is to consider their compatibility with the key diagnostic criteria of the disorder. The question is raised: *Are the four factors consistent with the known features of the disorder?* As noted in the Introduction, Internet gaming disorder classification contains 9 core criteria. It is proposed that the four identified factors may correspond to these criteria in the following ways:

4.1.1. Beliefs about game reward value and tangibility

This category of cognition is proposed to be most relevant to two criteria of IGD: “Preoccupation with Internet games (i.e., the individual thinks about previous gaming activity or anticipates playing the next game)” and Criterion E: “Loss of interests in previous hobbies and entertainment as a result of, and with the exception of, Internet games” (American Psychiatric Association, 2013). Given research findings that suggest that cognitive salience does not always distinguish between healthy enthusiasm and pathological behaviour (Charlton & Danforth, 2007), it is proposed that the *content* of preoccupation may be just as clinically relevant as the *frequency* of preoccupation. This factor suggests that specific thoughts related to the value and tangibility of the Internet game items, experiences, and avatars may be a key characteristic of clinical preoccupation. Loss of interest in other activities may be symptomatic of an overvaluing of Internet gaming experiences such that other activities are viewed as relatively less attractive or meaningful. In the absence of *overvaluing* or *avatar attachment* processes, preoccupation may indicate that the individual uses Internet gaming as a temporary method of distraction or escape from life problems (i.e., Internet gaming itself does not hold any significance in its own right).

4.1.2. Maladaptive and inflexible rules about gaming behaviour

This category of cognition is proposed to be most relevant to three criteria of IGD: Criterion C: “Tolerance – the need to spend increasing amounts of time engaged in Internet games”; Criterion D: “Unsuccessful attempts to control the participation in Internet games”; and Criterion F: “Continued excessive use of Internet games despite knowledge of psychosocial problems” (American Psychiatric Association, 2013). Within theories of behavioural addiction, these three criteria are often indicative of impairment in decision-making abilities (West, 2001). This factor suggests that Internet gaming may have a significant underlying decision-making component. Specifically, excessive gaming may be maintained by a process of adherence to multiple rules that enable the player to reach desired goals, or to justify past decisions, in the video game. This decision-making is governed by rules which lack the

necessary flexibility (e.g., “I can finish playing now without reaching the next level”) or an opposing protective belief (e.g., “I can take a night off from playing the game”) that would enable a person to avoid intrapersonal and interpersonal conflict.

4.1.3. Over-reliance on gaming to meet self-esteem needs

This category of cognition is proposed to be most relevant to two criteria of IGD: Criterion B: “Withdrawal symptoms when Internet gaming is taken away. (These symptoms are typically described as irritability, anxiety, or sadness, but there are no physical signs of pharmacological withdrawal)”; and Criterion H: “Use of Internet games to escape or relieve a negative mood (e.g., feelings of helplessness, guilt, anxiety)” (American Psychiatric Association, 2013). This factor suggests that excessive users of Internet games are drawn to the activity because it serves a function of building self-esteem by providing a sense of mastery, accomplishment, and autonomy. Immersion in gaming also provides an escape from unpleasant emotional states caused by negative core beliefs about the self, others, and the real world. This proposition is consistent with the qualifier that withdrawal symptoms are generally non-physical in nature, suggesting that withdrawal may be conceptualised as a negative mood state in response to removal of the primary source of self-esteem and positive hedonic experiences.

4.1.4. Gaming as a method of gaining social acceptance

This category of cognition is proposed to be most relevant to Criterion I of IGD: “Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of participation in Internet games” (American Psychiatric Association, 2013). This criterion suggests that Internet gaming may involve withdrawal from social relationships, however this may overlook the complexity of the social motivations of Internet gaming. This factor suggests that the social context of Internet gaming may enable the player to develop a network of online-based relationships, whilst also disengaging from social contacts who are incompatible with the individual’s gaming behaviour. Online relationships may be facilitated by the interaction of in-game avatars, including cooperative and competitive gaming activities which provide many opportunities for social advancement via leaderboards and player ranking systems. Such interactions can become more developed over time, as players form close social groups with rules and norms governing “good” and “acceptable” playing behaviour. Strict adherence to the online social group norms may be associated with the belief that the Internet game is the only place that is safe and accepting of the player (Caplan et al., 2009). Accordingly, individuals may perceive people outside of the Internet game are less important and/or unable to relate meaningfully to the player.

4.2. Measurement issues

This review has highlighted two main implications for measurement of Internet gaming disorder. First, the majority of studies that employed a cognitive therapy approach lacked a measure to assess cognitive change. This limitation could be addressed, in part, by the inclusion of measures that assess cognitive distortions (e.g., Li & Wang, 2013). Further work is needed to develop robust measures of IGD cognition and identify those cognitions with the strongest association with IGD. A second implication of this review is that the social context of Internet gaming should be taken into consideration during assessment, with a clear distinction made between the online versus real world. For example, the Young Internet Addiction Test (YIAT) asks whether the individual has chosen “to stay online rather than spend time with friends” (item 20). Similarly, the Addiction-Engagement questionnaire asks the individual whether their “social life sometimes suffered because of playing” (item 6). Such items may potentially overlook the social nature of Internet gaming. The degree of social interaction engaged in online should be clarified given that individuals with IGD may place special significance on certain online relationships. For example, it may be

helpful to map out clients’ significant online relationships using a modified genogram that documents frequency of contact, usual gaming activities, and age- and/or gender-appropriate indicators of intimacy or closeness of the relationship. Such material may facilitate discussion of the client’s social motivations for gaming and relevant factors that prevent the individual from engaging in real world relationships (e.g., lack of social skills, fear of judgement by others, or low self-worth).

IGD is often termed “Internet addiction” by researchers and clinicians (King et al., 2011). Therefore, the disorder is often positioned as most similar in nature to an addictive disorder such as pathological gambling. An assessment of the validity of the addiction model as it relates to Internet gaming was beyond the scope of this review, however it should be noted again that there is no firm consensus on whether IGD is an addiction (Blaszczynski, 2006; Shaffer, Hall, & Vander Bilt, 2000; Wood, 2008). One risk of accepting the DSM-5 classification of IGD is that it may potentially divert scholarly attention from alternative models of the disorder (or from considering refinements to the DSM-5 criteria), primarily by restricting measurement approaches or by narrowing research investigations of its possible correlates. Although the addiction model may be useful for its diagnostic terms (e.g., urges, impaired control, and withdrawal) (Griffiths, 2005), this review suggests that there may be some cognitive factors that warrant acknowledgement in its clinical formulation, if not its definitional criteria. As Lortie and Guitton (2013) have argued, for example, there has been a lack of recognition of the social motivations underlying Internet gaming disorder in its definitional criteria. The fourth factor identified in this review, *gaming as a method of social acceptance*, suggests that certain cognitions related to the social function of Internet gaming may be a notable psychopathological feature of the disorder.

4.3. Future directions for IGD research

The cognitive factors documented in this review may provide a useful guide for further empirical investigations of IGD, although further work is required to determine their validity and adaptation for measurement. Primarily, it would be useful to assess each factor’s association (i.e., convergent validity) with DSM-5 IGD criteria. This review also highlights several important avenues for future research and improvements in research design. Of the 29 reviewed quantitative studies, 27 employed a cross-sectional survey-based design. There is therefore a need for prospective longitudinal studies in this area, particularly for studies of adolescents in order to examine cognitive factors (among other risk factors) that may underlie the transition of Internet gaming problems into adulthood. More randomised controlled trials that employ CBT approaches tailored to Internet gaming are needed. Some existing treatment studies have been documented as not adhering to CONSORT guidelines, suggesting a need for improvement and consistency in multiple areas (King et al., 2011). This review has highlighted that the dominant CBT strategy for IGD has been a controlled behaviour plan informed by a functional analysis. The proposed factors may stimulate the development of new approaches that target specific cognitions (e.g., challenging beliefs that one is unable to cope without completing in-game objectives, or leaving a game unfinished). Finally, although many studies on IGD cognition have been published in specialist journals on adolescence and technology, there are few studies published within psychiatric and clinical psychology journals. This may be attributed to the lack of clinical samples generally employed in research in this area. Further studies should consider recruitment from youth and adult mental health services. A complementary research objective is to investigate the potential neurochemical, genetic antecedents, and brain function associated with cognition underlying gaming behaviours (Gyollai, Griffiths, Barta, Vereczkel, Urbán, Kun, et al., 2013). Finally, although not included in the results, there is some limited evidence to suggest that perfectionism may be a potential feature of IGD (Lehmann & Konstam, 2011), which may warrant further attention.

4.4. Limitations of the review

This review was the first systematic attempt to synthesise knowledge on cognitions underlying Internet gaming disorder. Although the review was guided by on the basic principles of standard cognitive conceptualisation (Beck, 1976), we caution that the identified factors should be considered an interpretation of findings guided, in part, by clinical judgement. Further examination and validation of these factors is required, and such work may identify alternative factors based on the research literature. Although the review was intended to be as inclusive as possible, clinical case report studies (e.g., Allison et al., 2006) and studies of problematic Internet use without direct reference to Internet gaming (e.g., Caplan, 2010) were not included, which may have excluded some clinical information of relevance. Another limitation of this review is that it was primarily concerned with conceptualisation of IGD, and therefore did not critically assess indicators of study quality (e.g., quality of assessment approaches) or weight of evidence (e.g., effect sizes of observed relationships between IGD and cognition). Relevant citations are provided to enable interested researchers and/or clinicians to refer to the original article material for the purpose of extending this analysis. It should also be noted that, although this review has focussed solely on IGD cognition, it should not be presumed that this work is advocating cognitive therapies (e.g., cognitive-behavioural therapy) as a first-line treatment for IGD. Rather, this review was intended to guide and improve such therapies. There is currently only limited support for the empirical efficacy of cognitive therapy for IGD (King, Delfabbro, & Griffiths, 2012; Winkler et al., 2013). As noted in the Results, this review remains limited in regard to explaining the precise conditions under which proposed cognitions may be indicative of pathological Internet gaming, including the extent to which this may vary according to the relative strength and frequency of activation of core cognitions and/or the absence of protective cognitions. Finally, it should be noted that the databases used to identify reviewed studies may not have identified studies published in non-English journals, such as South Korean and Chinese journals, although this is a common limitation of reviews (Winkler et al., 2013).

4.5. Conclusion

With its tentative recognition in the DSM-5, the core psychopathology and correlates of Internet gaming disorder are likely to be the subject of many future studies. Such investigations afford new opportunities to evaluate alternative perspectives and conceptual models of the disorder. This review proposes that there may be several important and distinct cognitive factors that underlie Internet gaming disorder. These include core beliefs about the player and perceptions of the nature of video gaming rewards, activities, and identities. Although often compared with problem gambling, IGD may have a unique cognitive profile with assumptions and beliefs that differentiate the disorder. The identified cognitive factors are presented to aid the conceptual refinement of IGD, although these factors also require further evaluation by studies employing both general population and clinical samples. Further studies on Internet gaming cognition may lead to development of new applications and/or refinements of cognitive-behavioural therapy for IGD for evaluation in clinical trials. Ultimately, it is hoped that continued basic and applied research on IGD may increase clinical knowledge and aid in recognition of IGD as a legitimate disorder.

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