Validation of the diagnostic criteria of Internet Gaming Disorder in the DSM-V among the esports community

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Declaration

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Overview of Portfolio

Internet gaming disorder (IGD) is a new and controversial psychiatric diagnosis that has recently been acknowledged by both the DSM-V and ICD-11 diagnostic manuals. IGD currently is categorised by a pattern of persistent or recurrent video gaming behaviour which leads to significant impairment in family, social, personal, occupational or other important areas of life. As a new psychiatric disorder, the current conceptualisation of IGD requires further research. This thesis aims to understand the association between IGD and ASD and assess the validity of IGD criteria for those who engage with esports. Part one of this portfolio presents a scoping review of all the literature exploring IGD in those with ASD. The findings of the review suggest that those with higher ASD traits are more likely to meet DSM-V criteria for IGD. Part two presents an empirical paper that looked to validate the current conceptualisation of IGD for individuals engaged with esports. The findings supported the DSM-V conceptualisation of IGD within the esports community and identified a potential increased risk of IGD for nonprofessional esports players.

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By

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Abstract

Internet Gaming Disorder (IGD) is still in the early stages of development as a disorder after being included as a condition for further study in the Diagnostic and Statistical Manual for Mental Disorders 5th Edition (DSM-V, American Psychiatric Association, 2013). There are questions about the validity of the current diagnostic criteria, particularly when distinguishing IGD from avid or professional gamers. This study aims to validate the DSM-V criteria for IGD, establish prevalence rates and identify predictive factors of IGD within the esports community. A sample of 147 esports players completed an online survey comprising of an IGD measure (IGDS9-SF) based on the DSM-V criteria and a range of health and demographic questions (Pontes & Griffiths, 2015). The IGDS9-SF significantly correlated with distress and disability. An exploratory factor analysis confirmed the IGDS9-SF criterion loaded onto a single factor. Using the 32-point cut-off for IGD on the IGDS9-SF, findings indicated that 11.64% of nonprofessional esports players and 5.26% of professional esports players met IGD cut-offs. Overall, level of disability was the only significant predictor of reaching the IGD cut-off. These findings support the DSM-V conceptualisation of IGD within the esports community and identify a potential larger risk for nonprofessional players. The clinical implications and future directions for research as result of these findings are discussed.

Introduction

History of Internet Gaming Disorder Criteria

Internet Gaming Disorder (IGD) is categorised by a pattern of persistent or recurrent video gaming behaviour which leads to significant impairment in family, social, personal, occupational or other important areas of life. It has been officially recognised by the DSM-V as a condition requiring further study (APA; American Psychiatric Association, 2013) and by the ICD-11 who have proposed online and offline variants of the condition (WHO; World Health Organisation, 2020).

The term IGD has changed and developed as technology has evolved. Soper and Miller (1983) first coined addiction to video games when they noticed children demonstrating addictive behaviours to arcade machines. One of the earliest descriptions is in a case study by Keepers (1990) who describes a teenager engaging with gaming as escapism from a traumatic home life, classifying it as a pathological preoccupation with video games. As the use of the internet became more widespread, the disorder "internet addiction" was used to describe the problematic use of any internet-based behaviours including but not limited to gaming (Young 1998). As video games became more popularised, researchers and clinicians become more concerned with excessive video game use and coined the term "gaming addiction" (Griffiths, 2005), which has more recently evolved into IGD (APA, 2013).

The two most recent conceptualisations of IGD are proposed by the ICD-11 and DSM-V. In the DSM-V, five of the nine diagnostic criteria (preoccupation or obsession, withdrawal, tolerance, loss of control, loss of interest continued overuse, deceiving, escape of negative feelings and functional impairment) must be met within a year to be diagnosed with IGD (APA, 2013). In the ICD-11, all three diagnostic criteria (impaired control over gaming, increasing

priority given to gaming, continuation or escalation of gaming despite occurrence of negative consequences) and demonstrable impairment must be met within a year to be given a diagnosis of IGD (WHO, 2020).

Current IGD concerns

The inclusion of IGD as a diagnostic criterion has been subject to some contention and criticism. Critics argue that the introduction of the DSM-V criteria for IGD was introduced too hastily, only reporting data from 12 studies and thus, failing to allow adequate time for researchers to study and come to a consensus on the most valid conceptualisation of IGD (Griffiths et al., 2016). To a certain degree, this has been acknowledged by the DSM-V, opting to place IGD in the conditions for further study section (APA, 2013). There is also debate about the inclusion of the word "internet" in IGD, as it implies that addictive gaming behaviour can only occur online, ignoring offline gaming methods (Kuss, Griffiths & Pontes, 2017). However, the APA states that IGD "could involve non-Internet computerized games" (APA, 2013, p. 796) with the ICD-11 having both online and offline variants of the diagnosis (WHO 2020).

Although there is a consensus that mental health disorders are often more complex than the criteria that make up their diagnosis, having specific, established, and agreed upon diagnostic criteria and clinical diagnoses provides professionals with a shared language for conditions. Such diagnoses allow for the development and implementation of efficacious treatment; a criterion for which researchers can investigate and compare results and a label that may provide some patients with access to appropriate care and potential destigmatisation of their experiences (Craddok & Mynors-Wallis, 2014).

The validation of diagnostic criteria is often done so using the five-phase approach developed by Feighner et al. (1972). After the establishment of content validity through clinical description, criterion related validity and construct validity can be tested through correlational studies often involving psychometric measures. Guidelines from numerous psychological governing bodies (e.g., the British Psychological Society, the American Psychological Association and the Australian Psychological Society) suggest that psychological assessments should include the use of reliable and valid psychometric measures alongside clinical judgement.

There is currently no consensus on the best psychometric measure to assess symptoms of IGD. King et al. (2020) identified 32 different published measures since 2013, averaging 2.5 new measures published annually, with large inconsistencies of DSM-V and ICD-11 criteria coverage. After a systematic review, they found that there was no clear superior measure. However, the AICA-S gaming, GAS-7, IGDT-10, IGDS9-SF and Lemmens IGD-9 had the strongest evidential support for their psychometric properties. Of those most supported, only the IGDS9-SF and the Lemmens IGD-9 cover all of the DSM-V criteria and ICD-11 diagnostic criteria.

This lack of consensus potentially explains the variance in prevalence rates across studies and cultures. Across these different measures, the prevalence of IGD varies vastly from 3.2-91% in clinical populations and 0.21-57.5% in general populations (Darvesh et al., 2020). Significant risk factors for being diagnosed with gaming disorder in the general population include functional and dysfunctional impulsivity, belief/self-control, anxiety, pursuit of desired appetitive goals, money spent on gaming, weekday game time, offline community meeting attendance, and game community membership (Rho et al., 2018).

One of the communities seemingly most at risk of gaming disorder is the esports community; esports referring to the act of engaging with video games competitively and professionally. The current global number of gamers is estimated to be 2.7bn with this number increasing by 5.3% year on year (Newzoo, 2021). About 473 million of these gamers estimated to watch or engage with esports, and this number is predicted to reach 577.3 million people by 2024 (Newzoo, 2021). As the popularity and accessibility of gaming and subsequently esports increases, it seems realistic to predict that this will be accompanied by an increase in problematic use of games and consequently, an increase in the prevalence of IGD (Chung et al., 2018).

There are further concerns about the DSM-V conceptualisation of IGD particularly when applied to those who engage with esports. The preoccupation criterion (i.e., “Do you spend a lot of time thinking about games even when you are not playing or planning when you can play next?”) is felt to possibly pathologize the experiences of gamers (Kardefelt-Winther, 2014, 2015a). Critics argue that those enthusiastic about an activity (i.e., gaming) will invest a large proportion of the time discussing and thinking about those activities they enjoy the most (Griffiths et al., 2016). Studies have found that gamers spend substantial proportions of time conversing about tactics and gaming builds, an aspect particularly critical for professional gamers (Faust, Meyer, & Griffiths, 2013; Ko et al., 2014).

Although it has demonstrated high accuracy, some investigators feel the wording of the tolerance criteria (i.e., “Do you feel that you should play less, but are unable to cut back on the amount of time you spend on playing games?”) should be edited to more accurately reflect an individual’s wish to disengage from gaming (Griffiths et al., 2016; Ko et al., 2014). Some individuals may find gaming ego syntonic despite potential negative consequences, and there is

often a social expectation to engage with gaming in younger people often not acknowledged by older generations (Kardefelt-Winther, 2015a, 2015b; Van Rooij & Prause, 2014).

The stopping other activities criterion (i.e., “Do you lose interest in or reduce participation in other recreational activities [hobbies, meetings with friends, etc.] due to gaming?”) has also been questioned. Giving up activities to game cannot be considered in itself problematic unless it directly leads to negative consequences. Exchanging activities for those we have become interested in is a normal developmental process. However, dropping other activities could also be a symptom of depression which is thought to be highly comorbid with IGD (Kuss & Lopez-Fernandez, 2016).

Several studies have found that the deception criterion (i.e., “Do you lie to family, friends, or others about how much you game, or try to keep your family or friends from knowing how much you game?”) has low endorsement within clinical populations, leading some studies to exclude the criterion (King et al., 2013; Ko et al., 2014; Tao et al., 2010). For this criterion to fully apply, gamers will need to live with other people, or in close proximity to others (Griffiths et al., 2016). Moreover, some argue this criterion is more likely to be strongly influenced by the perceptions of others (i.e., older family members) as gamers will be less likely to disclose information regarding their gaming to family members if they perceive it to be a pointless hobby (Kardefelt-Winther, 2015a).

The APA criteria implies that individuals will experience some degree of withdrawal symptoms (i.e., Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity). A systematic review of 34 studies exploring the state of current knowledge of withdrawal symptoms for gaming found weak support for evidence of

withdrawal symptomology from gaming, describing a lack of qualitative studies and subsequent poor conceptualisation of withdrawal symptomatology in quantitative studies (Katis et al., 2016). Furthermore, there is no clear evidence of a negative physiological impact due to changes in biochemistry as seen in withdrawal during substance misuse disorders (Griffiths, 2010; Hellman et al., 2013; Kardefelt-Winther, 2015a).

The final criterion (i.e., "Do you risk or lose significant relationships, or job, educational or career opportunities because of gaming?") seems to lack the diagnostic specificity to differentiate between high engagement and gaming addiction (Duven et al., 2015). It has been suggested that this may be down to the wording of this criterion. Suggestions include adding the loss of potential opportunities (rather than the loss of something) and to specify that the loss of relationships is a result of gaming and preoccupation with gaming. The original "because of gaming" does not appear to be precise enough and may not be as useful for the IGD criteria (Griffiths et al., 2016).

Esports and IGD

Between 2002 and 2018, Reitman et al. (2020) identified 150 studies relating to esports, none of which addressed IGD and very few addressed the wellbeing of this population. Despite the esports community continually growing and potentially being at higher risk of IGD, only a handful of studies have investigated the relationship between IGD and esports players (Bányai et al., 2019; Bányai et al., 2021; Evren et al., 2018). These studies have also yet to explore the impact of IGD on the different levels of esports players (i.e., professional and non-professional players). As with most sports, those who reach the peak of their field can have professional careers in their chosen sport, with professional esports players having access to an array of

resources (ie., managers, coaches, training facilities) and prize funds not accessible by non-professional players (Seo, 2013). This difference in skill level and resources between professional and non-professional players may interact with the impact of IGD. As the esports population is an ever growing and popular community it appears now is the time to engage this community in the conversation and begin to assess/validate IGD among esports players.

Numerous studies have compared the association of IGD with measures of distress and disability to measure the validity of the IGD across numerous communities (Koo et al., 2017; Vahidi et al., 2019). Of the two most validated measures that cover both DSM-V and ICD-11 diagnostic criteria, the IGDS9-SF scored the highest on King et al. (2020) review tool suggesting it may be the most appropriate measure to assess IGD. The aim of this study is to establish whether the DSM-V criteria for IGD (using the IGDS9-SF) is a valid conceptualisation for the esports community.

Specifically, we sought to answer the following questions:

1) Is the IGDS9-SF predictive of distress and disability in esports players?

   If yes, then:

2) What is the prevalence rate of IGD among esports players?

3) Is there a difference in IGD prevalence between professional and non-professional esports players?

4) What demographic criteria were most predictive of IGD among esports players?

Methods

Design

This study utilised a quantitative cross-sectional design through the use of self-completion measures. This design allowed for the validation of the IGD measures, estimation of IGD prevalence rates and assessment of relationships between variables.

Recruitment

Participants were recruited through self-selection and snowball sampling. An advert comprising a brief description of the study, inclusion criteria and link to the online survey were created. We contacted over 200 esports teams and societies through social media platforms to share the advert and discuss the study. The advert was also subsequently distributed through a YouTube advert for several weeks targeted at esports players via Google Advertising.

Participants

Inclusion criteria were those who could read and write in English, were aged 16 years or older and identified as a professional esports player or non-professional esports player. For the purpose of this study, a professional esports player was defined as being an individual with a work contract for an esports team and a non-professional esports player being an individual without the esports contract who has the relevant game skills or status (Khromov et al., 2019).

A total of 371 individuals accessed the online questionnaires. Of these, 146 questionnaires were fully completed by eligible participants. The final sample of 146 participants (mean age =20.66 years, *SD* =2.61) consisted of 19 (13.01%) professional esports players and 127 (86.99%) non-professional esports players of which 123 (84.2%) identified their gender as male, 16 (11%) female, 4 (2.7%) non-binary, 1 (0.7%) agender, 1 (0.7%) gender fluid and 1 (0.07%) did not

specify (Table 1). Seventy-two (49.3%) of the participants were located in the UK with the remaining participants located across 17 different countries (Table 2.).

Materials

English Version of the IGDS9-SF

The English version of the Internet Gaming Disorder Scale 9 – Short Form (IGDS9-SF) is a 9-item scale designed as a brief measure of gaming disorder over the last 12 months (Pontes & Griffiths, 2015). The test has a 5-point Likert response scale (ranging from 1 = never to 5 = very often). The final score ranges from 9 to 45, with higher scores being indicative of a higher degree of disordered gaming. The IGDS9-SF covers all 9 DSM-V criteria and has demonstrated good internal consistency and validity (King et al., 2020).

There is no agreed upon classification for meeting the criteria of IGD using the IGDS9-SF with there currently being five different methods. Pontes and Griffiths (2015) originally based classification for IGD from the APA (2013) criteria of endorsing at least five of the IGD criteria (endorsement being scoring 5 “very often”). This has been the most commonly used criteria in other validation studies. However, Qin et al. (2020) found that using a cut-off of 32 produced high sensitivity (98.0%), specificity (91.9%) and diagnostic accuracy (96.1%). This cut-off score is now listed on the official IGDS9-SF site (Pontes, 2022) and was suggested to be used by a recent systematic review of the psychometric properties of the IGDS9-SF (Poon et al., 2021). As such, this study has opted to use the 32-point cut-off as meeting the criteria for IGD across all statistical tests. However, this study will also report the APA estimated prevalence for the overall sample to allow for a clearer comparison with past studies.

K10

The Kessler 10 (K10) Scale is a 10-item scale designed as a brief measure of non-specific psychological distress (Kessler et al., 2003). The test has a 5-point Likert response scale (ranging from 1 = none of the time to 5 = all of the time). With the final score ranging from 10 to 50, with higher scores being indicative of a higher degree psychological distress. The K10 has demonstrated good internal consistency and validity and has been used previously to validate gaming disorder scales based on the DSM-V criteria (Pearcy, Roberts & McEvoy, 2016; Andrews & Slade, 2001).

WHODAS 2.0

The World Health Organisation Disability Assessment Schedule 2.0 (WHODAS) is a 12-item measure of disability designed to measure health and disability across cultures (Üstün, 2010). The test has a 5-point Likert response scale (ranging from 0 = none to 5 = extreme of cannot do). The final score ranges from 0 to 60, with higher scores being indicative of a higher degree of overall disability and poor health. This measure has demonstrated good internal consistency and validity and has been used previously to validate gaming disorder scales based on the DSM-V criteria (Pearcy, Roberts & McEvoy, 2016; Andrews, et al., 2009).

Self-Report Measure

A brief self-report measure designed in consultation with the esports community was also used to gather demographic information and further relevant information about gaming habits. The self-report measure collected data on age, gender, weekly hours spent gaming, percentage of time spend gaming competitively, monthly spend on gaming related activities, frequency of esports competitions competed in, game types played during esports competitions and whether participants played in team or individual esports competitions. Participants were asked to self-

identify their gaming status as either a professional esports player (an individual with a work contract for an esports team), non-professional esports player (an individual without an esports contract who has the relevant games skills/status and participates in esports events), casual gamer (an individual who plays games, and may watch esports, but does not participate in esports competitions) or not a gamer (an individual who does not regularly or at all play games). Along with these demographic questions, a question suggested by Kings et al. (2013) inquired whether participants or their significant others considered that their video-gaming behaviour is problematic. Participants were asked to rate the following two questions with a 4-point Likert scale (1= strongly disagree to 4= strongly agree); "Do you believe that your video gaming behaviour is problematic?" and "Regardless of your answer to the previous question, do any of your significant others believe your video gaming behaviour is problematic?".

Procedure

After obtaining approval from the University of Surrey's Ethic Committee, an online survey containing all reported measures above were hosted on Qualtrics. Before sending to participants, the online survey was piloted by several gamers on multiple devices to ensure questionnaires functioned as designed and to receive feedback on the flow of the questionnaires. After amendments from the feedback, the survey was opened to the public and shared as described in the participants' section. Participants who accessed the survey were given the option to read and download a detailed information sheet and consent form about the study before agreeing to take part. After providing consent, participants were asked to self-identify their gaming status, age and language. Those that did not meet the eligibility criteria were thanked for their time and could no longer access the survey. Those eligible to take part in the study subsequently completed the demographic questionnaire, K10, IGDS9-SF and WHODAS 2.0,

taking approximately 15 minutes. Data collection covered the period between January 2021 to January 2022. Data was then downloaded from Qualtrics.com into SPSS for analysis. Due to the sample size being smaller than expected sensitivity power calculations at 0.8 power (Cohen, 1992), were subsequently run for the appropriate statistical tests using G*Power (Faul, Erdfelder, Buchner & Lang, 2009).

Ethics

The protocol for this study was assessed and approved by the University of Surrey's Ethic Committee before the study commenced. As this was an online study exploring clinical symptoms, the two largest ethical concerns were data protection and the wellbeing of participants. In line with General Data Protection Regulation (GDPR) guidelines all relevant aspects of the research project including the process of data storage was shared with participants via the provided information sheet. Minimal personable identifiable information (date of birth, gender & IP address) was obtained and participants were given a randomly generated ID number linked to their data to protect anonymity should they need to contact the researchers. Upon completion of the study all data was downloaded from the Qualtrics website and stored on the secure University of Surrey server. In regard to the clinical wellbeing of participants, all participants were given links to worldwide mental health resources/charities for gamers as part of their information sheet.

Results

Gaming Behaviours

Participant data regarding number of hours a week spent gaming, percentage of weekly time dedicated to competitive gaming (i.e., training, coaching, competitions), average monthly

spend on gaming related activities, preferred gameplay type of esports events and method of engagement with esports events (i.e., individual, team or mixed events) was collected using a self-report measure. Data has been summarised in Tables 3, 4 and 5.

Table 3. Time and Money Spent on Gaming

	Mean	**SD**	**Min**	**Max**
Weekly Hours spent gaming	33.29	18.62	6	100
% of gaming played competitively	35.26	28.183	0	100
Monthly spend on gaming (£)	46.39	189.95	0	2197.04

Table 4. Frequency of Esports Competitions Entered

Frequency	**n**	**%**
Daily	16	11
At least once a week	66	45.2
At least once a month	24	16.4
At least once every 3 months	26	17.8
At least once a year	10	6.8
Less often than once a year	4	2.7

Table 5. Type of Games Played

Game Type	**n**	**% of sample (n=146)**	**% of total game types played (n=235)**
FPS	107	73.29	45.53
MOBA	51	34.93	21.70
Fighting	19	13.01	8.09
RTS/Strategy	16	10.96	6.81

Card Games	13	8.90	5.53
Sports	11	7.53	4.68
Racing	4	2.74	1.70
Rocket League	3	2.05	1.28
Other	11	7.53	4.68

**Gaming Definitions: First Person Shooter (FPS), Multiplayer Online Battle Arena (MOBA), Real Time strategy (RTS)*

Data Distribution

The data for the K10 (Figure 1), WHODAS 2.0 (Figure 2) and IGDS9-SF (Figure 3) were all similarly positively skewed. As these are all measures of distress being applied to a non-clinical sample, the majority of participants are expected to score in the lower end of the scale (i.e., low distress) and a positive skewness is expected. Although expected, the data is not normally distributed, and thus non-parametric statistics were used for the majority of data exploration.

Distress and Disability

To test the association between IGD, mental distress and overall disability, spearman rank correlations of the WHODAS and K10 with the IDGS9-SF were conducted. There was a significant positive correlation between IGD score and mental distress (r (146) = .47, $p < .001$) and a significant positive correlation between IGD Score and overall levels of disability (r (146) = .65, $p < .001$). A sensitivity analysis found that a spearman rank correlation coefficient with 146 participants with $a = .05$ would have a power of 0.8 to detect a correlation effect of $r = .23$.

After establishing that the IGDS9-SF was significantly associated with distress and disability, two Mann-Whitney U tests were conducted to establish whether there was a significant difference in distress and disability between those that did and did not meet the 32-point cut-off for IGD on the IGDS9-SF. Scores for distress (K10) for those meeting IGD cut off (M = 31.82) were higher than those not meeting IGD cut off (M = 21.85). The first Mann-Whitney Test indicated that this difference was statistically significant (U (N_1 = 17, N_2 = 129) = 438, z= -4.03, p < .001). Scores for overall disability (WHODAS 2.0) for those meeting IGD cut off (M = 31.29) were higher than those not meeting IGD cut off (M = 19.33). The second Mann-Whitney Test indicated that this difference was statistically significant (U =239.5 (N_1 = 17, N_2 = 129) = 239.5, z = -5.24, p < .001). A sensitivity power analysis found that a Mann Whitney U test (N_1 = 17 and N_2 = 127) with a = .05 would have a power of 0.8 to detect a difference of Cohen's d = .74.

Factor Analysis

As the IGDS9-SF and 32-point cut-off appeared to be predictive of distress and disability it was important to examine the internal reliability of the measure. To ensure that all questions on the IGDS9-SF were measuring the same concept, principal axis factoring was used to explore the factor structure of the IGDS9-SF items using the entire sample (n=146). Sampling adequacy (KMO =.89) and sphericity (X^2 (36) = 595.36, p < .001) indicated the data was appropriate for factor analysis. The IGDS9-SF items loaded on a single factor (eigenvalue greater than one; please see Figure 4) explaining 51.28% of the variance (range of loadings .55-.81) (please refer to Table 6). Although there was sufficient number of participants to conduct exploratory factor analysis based on a 15:1 participant to variable ratio there was not sufficient data to run a confirmatory factor analysis (Thompson, 2004).

Table 6. Factor Loadings

Item	Factor Loadings
7. Have you deceived any of your family members, therapists or others because the amount of your gaming activity?	.81
2. Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity?	.80
4. Do you systematically fail when trying to control or cease your gaming activity?	.79
6. Have you continued your gaming activity despite knowing it was causing problems between you and other people?	.78
9. Have you jeopardized or lost an important relationship, job or an educational or career opportunity because of your gaming activity?	.76
3. Do you feel the need to spend increasing amount of time engaged gaming in order to achieve satisfaction or pleasure?	.67
5. Have you lost interests in previous hobbies and other entertainment activities as a result of your engagement with the game?	.63
1. Do you feel preoccupied with your gaming behaviour?	.60
8. Do you play in order to temporarily escape or relieve a negative mood (e.g., helplessness, guilt, anxiety)?	.55

IGD Prevalence Estimate

As the IGDS9-SF appeared to be a valid and reliable tool for measuring IGD in this esports sample, IGD prevalence estimates using both the cut-off score of 32 and the APA classification for IGD were established. Based on the cut-off score of 32 for classifying IGD, IGD prevalence estimate in the overall sample was 11.64%, 95% CI [0.07, 0.18]. The IGD prevalence estimate was 12.6%, 95% CI [0.07,0.20] in non-professional esports players, which was higher than the 5.26%, 95% CI [0.01, 0.26] found in the professional esports players. Using the APA classification for IGD, the overall prevalence estimate was 3.42%. Table 7 presents the prevalence estimates comparisons between groups and IGD classifications.

Table 7. IGD Prevalence Estimates

	IGDS9-SF ≥ 32		95% CI		APA	
	n	%	LL	UL	n	%
Overall Sample	17	11.64	0.07	0.18	5	3.42
Professional Esports Players	1	5.26	0.01	0.26		
Non-Professional Esports Players	16	12.60	0.07	0.20		

IGD comparison between professional and non-professional esports players

In order to compare the overall levels of distress, disability and IGD between the professional and non-professional esports players, nonparametric independent tests were used to compare the mean scores of professional and non-professional gamers on measures of IGD (IGDS9-SF), disability (WHODAS) and distress (K10). No significant differences were found between professional and non-professional esports players on overall scores on IGD (U (N_1 = 19, N_2 = 127) = 1338.5, z = .77, p = .442), mental distress (U (N_1=19, N_2=127) = 1178, z = -.17, p =.868,) or overall disability (U (N_1 = 19, N_2 = 127) = 1416, z = 1.22, p =.222). A sensitivity power analysis found that an independent t-test (N_1 = 19, N_2 = 127) with a = .05 would have a power of 0.8 to detect a difference of Cohen's d = .63.

To establish if there was a significant difference in the prevalence of IGD between professional and non-professional esports players a chi-squared test was performed. The results

of the chi-squared test confirmed the relationship between these variables was not significant, X^2 (1, N=146) = .864, p = .353). A sensitivity power analysis found that a chi-squared test with 146 participants and a = .05 would have a power of 0.8 to detect a difference of w = .23.

IGD Associates

To establish which demographic variables were most predictive of meeting the IGD cut-off, a logistic regression was conducted. A binomial logistic regression was performed to ascertain the effects of age, weekly hours played, competitive percent played, money spent, tournaments played, overall score on mental distress and overall disability on the likelihood that participants meet the IGD cut off.

Linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure. A Bonferroni correction was applied using all fifteen terms in the model resulting in statistical significance being accepted when p < .003 (Tabachnick & Fidell, 2014). Based on this assessment, all continuous independent variables were found to be linearly related to the logit of the dependent variable. There were two standardised residuals with a value of 3.116 and 3.097 standard deviations which appeared to be examples of natural variation and were kept in the analysis (Yang & Berdine, 2016). Both gender and team type predictors were removed from the regression due to showing variance inflation factors (VIF) above 2.5 violating the multicollinearity assumption (Johnston, Jones & Manley, 2018).

A total of 146 cases were analysed, and the full model significantly predicted meeting IGD cut-off (X^2 (7, N = 146) = 33.25, p < .001). The model accounted for 40% (Nagelkerke R^2) of the variance in IGD cut-off scores, with 23.5% of those meeting IGD cut-off being correctly

predicted and 96.9% of those not meeting IGD cut-off being correctly predicted. Overall, 88.4% of predictions were accurate. A sensitivity power analysis found that a binominal logistic regression with 146 participants and a = .003 would have a power of 0.8 to detect a odds ratio of 0.17. Table 8 shows that only overall disability reliably predicted meeting IGD criteria.

Table 8. Logistic Regression Predictors

	B	SE	Wald	*df*	*P*	Odds Ratio	95% CI	
							LL	UL
WHODAS 2.0	0.165	0.047	12.354	1	<0.001	1.179	1.076	1.292
Age	0.114	0.112	1.037	1	0.308	1.121	0.900	1.398
K10	0.039	0.038	1.036	1	0.309	1.040	0.965	1.121
Average Gaming Related Spend	-0.002	0.002	0.752	1	0.386	0.998	0.995	1.002
Frequency of esports competitions	-0.180	0.273	0.434	1	0.510	0.835	0.489	1.427
Percentage of time on competitive gaming	0.002	0.012	0.024	1	0.877	1.002	0.979	1.025
Hours a week spent gaming	-0.002	0.019	0.008	1	0.928	0.998	0.962	1.035

To establish which demographic variables were most predictive of overall IGDS9-SF score a multiple linear regression was also conducted. The multiple linear regression was run to predict IGDS9-SF overall score from age, weekly hours played, competitive percent played, money spent, tournaments played, overall score on mental distress, and overall disability.

There was sufficient independence of residuals, as assessed by a Durbin-Watson statistic of 1.002 (Field, 2009). Both gender and team type predictors were removed from the regression

due to showing variance inflation factors (VIF) above 2.5 violating the multicollinearity assumption (Johnston, Jones & Manley, 2018). There was homoscedasticity, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. There was one standardised residual with a value of 3.030 which appeared to be due to natural variation and was kept in the analysis (Yang & Berdine, 2016). A sensitivity power analysis found that a multiple linear regression with 146 participants, 7 predictors and $a = .05$ would have a power of 0.8 to detect a correlation of $r = .10$.

These variables significantly predicted IGDS9-SF overall score (F (6, 139) = 20.843, $p<0.001$, $R^2 = .474$). Only overall disability significantly predicted overall IGDS9-SF score (Table 9).

Table 9. Multiple Linear Regression Predictors

	B	*SE B*	Beta	T	P	95% CI	
						LL	UL
WHODAS 2.0	0.594	0.084	0.595	7.088	<0.001	0.429	0.760
Hours a week spent gaming	0.046	0.029	0.109	1.625	0.106	-0.010	0.103
K10	0.111	0.072	0.126	1.537	0.127	-0.032	0.254
Average Gaming Related Spend	-0.003	0.003	-0.061	-0.885	0.378	-0.008	0.003
Percentage of time on competitive gaming	0.002	0.018	0.007	0.114	0.909	-0.034	0.038
Frequency of esports competitions	0.019	0.423	0.003	0.044	0.965	-0.818	0.855

Discussion

Distress and disability

One of the key concerns of applying IGD criteria to the esports community was that esports players who present with symptoms of IGD may not experience the same degree of distress and disability due to the nature of their interaction with games. For IGD criteria to be considered a valid mental disorder for esports players, it needs to demonstrate similar levels of distress and disability as other mental health disorders.

This study found that there was a significant correlation between overall IGD severity and mental distress. Further comparisons found that those who met IGD cut-off criteria showed significantly higher levels of mental distress than those not meeting the IGD cut-off. According to the Kessler 10 norms (Andrew & Slade, 2001), the mean score of those meeting IGD cut-off (31.82) is classified in the severe range for mental distress (30+). In comparison, the mean score of those not meeting IGD cut-off (21.85) is classified in the mild range (20-24). These findings are in alignment with studies across different populations (Pearcy, Roberts & McEvoy, 2016; Poon et al, 2021) and suggest that individuals identified as having IGD using the IGDS9-SF criteria in our sample may be likely to experience similar levels of mental distress as other mental health disorders.

This study also found a significant positive correlation between overall IGD score and overall level of disability. Further comparisons found that those who met IGD cut-off criteria showed significantly higher levels of disability than those not meeting the IGD cut-off. WHODAS 2.0 was also a significant predictor of meeting IGD cut-off and overall IGDS9-SF score in the logistic regression and multiple linear regression, respectively. Normative data for

the WHODAS 2.0 12-item scale suggests that people with mental health disorders report the highest scores compared to those with physical disorders and no disorders (Andrews et al., 2009). These results along with those of the Kessler-10 suggest that IGD symptoms in our sample are associated with higher levels of distress and disability for the esports community and thus could be considered as a significant mental health concern.

Factor structure

The exploratory factor analysis reported that the IGDS9-SF criterion loaded on a single factor, suggesting that the IGD symptoms in the esports community reflect a single underlying factor. These results are in alignment with 21 recent studies using the IGDS9-SF across different population groups (Poon et al, 2021) including a sample of gamers of which some identified as esports players (Evren, et al., 2018). These results support the construct of IGD when applied to esports players.

Prevalence rates of IGD

The prevalence rates of IGD established using the IGDS9-SF varies with rates ranging from 0.7% (Arcelus et al., 2016) to 43% (Ferraro, et al., 2020). This variation within the IGDS9-SF studies is due to the variation in population groups and chosen definitions for clinical cut off.

Although this is the first study to investigate those identifying as professional and non-professional esports players, one previous study has reported a prevalence rate of 2.57% in the portion of their sample who reported to be involved in esports (Evren et al., 2018). This estimation is much lower than the overall estimation of 11.64% found in our study. This is most likely due to the difference in the operationalisation of meeting an IGD diagnosis. Evren et al. (2018) conducted their study before the introduction of the 32-point cut-off and opted to use

endorsement of five of the nine IGDS9-SF criteria (endorsement being scoring 5 “very often”) as their criteria for meeting IGD disorder. When the same criteria were used on our sample, we obtained a similar prevalence of 3.4%, suggesting that these previous conceptualisations may underestimate the prevalence of IGD.

Our prevalence estimations for the esports community are also relatively similar to those found in the general population of gamers when using both the 32-point cut off (7.3%; Tso et al., 2022) and the endorsement of five criteria (4.97%; Pontes, Schivinski, Kannen & Montag, 2022). This suggests that those who play esports both professionally and non-professionally may not be significantly more likely to be diagnosed with IGD.

Although our results found that there was no significant difference in the prevalence of IGD between professional (5.26%) and non-professional (12.60%) esports players, non-professionals are more than twice as likely to reach the cut-off for IGD. This may be due to the difference in support given to professionals, who often have a team and staff members who can provide emotional and social support to better manage with mental health difficulties (DiFrancisco-Donoghue et al., 2019; Freeman & Wohn, 2017). It should also be noted that the t-tests conducted to compare the prevalence between these groups was only able to detect effect sizes of .63 or larger. Meaning that these tests may have been unable to detect smaller but significant differences between the groups increasing the risk of type 2 error (Field, 2018). However, the Chi-squared test also reported a non-significant difference and was able to detect much smaller effect sizes (w =.23).

Furthermore, other professions in which a DSM-V diagnosis for behavioural addiction exist, such as gambling, have shown higher rates of gambling addiction in those that self-identify

as semi-professional gamblers compared to those that identify as professional gamblers (Hing, Russsel, Blaszcynski & Gainsbury, 2015). Some studies suggest that this difference may be due to individuals rationalising addictive behaviours as professional behaviours that are more socially acceptable (Carroll et al., 2013; Taber et al., 1986). This could be similar to non-professional esports players rationalising extensive and addictive gaming as training or competing.

Predictive Criteria

Contrary to previous studies (Pontes, Macur & Griffiths, 2016; Pontes, Schivinski, Brzozowska-Woś & Stavropoulos, 2019), our results found that weekly time spent gaming was not a significant predictive factor of IGD. Furthermore, the reported average time spent gaming per week by our sample (33.29h) was very similar to the average 34.53h of gaming per week in those meeting IGD criteria in a large scale study of gamers (Pontes, Schivinski, Kannen & Montag, 2022). These results suggest that the current APA suggestion that those with IGD will "typically devote 8–10h or more per day to this activity and at least 30 h per week" (APA, 2013, p. 796) may not apply to the esports community. It is not surprising that this sample has a higher average weekly time spent gaming, as esports players use video games differently than traditional gamers and often play for longer periods (Bányai, Griffiths, Demetovics & Király, 2019) and with different motivations (i.e., competition and self-development) (Himmelstein, Liu & Shapiro, 2017; Kim & Thomas, 2015). As such, these findings may be best explained by more recent findings of a significantly mediated effect via escapism between higher levels of gaming disorder and psychiatric distress in esports players (Bányai, Griffiths, Demetovics & Király, 2019). This suggests that clinicians assessing those in the esports community may find that indicators of functional impairment and motivation for gaming are more reliable indicators of IGD than time spent playing (Billieux et al., 2017).

Limitations and Strengths

There are some limitations regarding data collection. First, the current sample was collected via snowball sampling and were thus self-recruited, limiting the generalisability and representativeness of the results. The study was conducted using self-report measures which present with the risk of response bias. However, the internet increases privacy-perception and may have led to greater disclosure of information. The cross-sectional design of this study means that we are unable to make causal inferences about the relationships between examined variables and predictors. There is still no agreement on the best way to classify IGD when using IGD measures and as such, current estimated prevalence should be interpreted with caution until a consensus is agreed. However, this is one of the first studies to report data using the newly introduced 32 points cut off and provide comparison with the APA criteria cut-off.

To the authors knowledge, this is also the first study to investigate the difference in IGD prevalence between professional and non-professional esports players, providing novel research that contributes to the growing literature on the psychosocial impact of esports. The overall sample size, and particularly the sample size of professional esports players, was relatively small in the context of a psychometric study which increases the likelihood of a type II error. The gender distribution in the current study was also heavily weighted towards males and does not appear to reflect the current gender distribution of esports players (Rogstad, 2021). The sample was, however, clinically representative of the general population with 65% of all participants scoring within the lower range of the K10 similar to the 70% reported in the normative data (Slade, Grove & Burgess, 2011).

This study also included a large amount of variation in the power of the statistical tests used. The chi-squared test, multiple linear regression and logistic regression were shown to be sensitive to small effect sizes with the spearman rank correlations showing to be sensitive to medium effect sizes (Field, 2018). Therefore, it is likely that these tests had strong statistical power to reliably detect significant effects. Both the Mann Whitney U and independent t-tests were shown to only be sensitive to large effect sizes (Field, 2018). Meaning both these tests may have lacked the statistical power to reliably detect significant differences between groups. This is particularly problematic for the t-tests comparing the difference in prevalence between professional and non-professional players which reported a non-significant result (Kraemer & Thiemann, 1987). The lack of power in this test means we cannot be certain that the difference between these groups is non-significant using the t-test alone. However, the Chi-Square test which has much stronger statistical power also reported no significant difference between these groups.

Implications for Clinical Practice and Future Research

These results provide some evidence that could support the APA conceptualisation of IGD and the use of the IGDS9-SF as a psychometric tool to improve the psychological assessment of IGD in those engaged in esports at all levels. This tool will help clinicians provide evidence-based assessments as suggested by professional psychological bodies (e.g., the British Psychological Society, the American Psychological Association and the Australian Psychological Society).

These results have shown similar prevalence rates of IGD in the esports community as those found in the general population suggesting that those engaged with esports may not be at significantly more risk of meeting IGD criteria than the general population. The results, however,

did reveal that non-professional players were twice as likely to meet IGD criteria than professional players. These findings suggest that grass root esports communities (i.e., universities, colleges, online gaming societies) may need to provide further mental health support to their communities. More specifically these communities could provide psychoeducational material regarding IGD and signpost players to local mental health services.

This is the first study to investigate the differences in IGD between professional and non-professional esports players. Future research with larger sample sizes is required to further confirm the reliability of these results. Researchers must explore the underlying factors in the difference of IGD prevalence between these samples.

The large difference between the 32-point cut off and APA criteria prevalence rates for IGD reported by this study highlights the need for a consensus on the conceptualisation of IGD when using the IGDS9-SF outcome measure. Further research should be conducted into the validity of the 32-point cut-off and APA criteria cut-off. Clarification would improve the accuracy of identifying clinical cases during treatment and the estimated prevalence rates in epidemiological studies.

Conclusions

The results of this study provide some evidence that the DSM-V criteria for IGD may be a valid conceptualisation when applied to those who engage with esports. When comparing these results to other populations esports players appear to have similar levels of IGD symptoms. However, emerging evidence suggests non-professional players may be more at risk of meeting IGD criteria than professional players. Furthermore, results support more current research that

amount of time gaming may not be the most effective indicator of IGD, particularly for those engaged with esports.

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Table 1

Table 1. Demographic Characteristics

	Mean	**SD**	**Min**	**Max**
Age (Years)	20.66	2.61	17	33
	n	**%**		
Gaming Status				
Professional Esports Player	19	13.01		
Non-Professional Esports Player	127	86.99		
Gender				
Male	123	84.2		
Female	16	11		
Non-Binary	4	2.7		
Agender	1	0.7		
Gender Fluid	1	0.7		
Did not Specify	1	0.7		

Table 2

Table 2. Location of participants

Country	n	%
UK	72	49.3
New Zealand	17	11.6
Australia	14	9.6
Norway	12	8.2
USA	5	3.4
Germany	5	3.4
India	5	3.4
Denmark	3	2.1
Netherlands	3	2.1
Sweden	2	1.4
Austria	1	0.7
Canada	1	0.7
Finland	1	0.7
France	1	0.7
Peru	1	0.7
Poland	1	0.7
Republic of Ireland	1	0.7
Singapore	1	0.7

Table 3

Table 3. Time and Money Spent on Gaming

	Mean	**SD**	**Min**	**Max**
Weekly Hours spent gaming	33.29	18.62	6	100
% of gaming played competitively	35.26	28.183	0	100
Monthly spend on gaming (£)	46.39	189.95	0	2197.04

Table 4

Table 4. Frequency of esports competitions entered

Frequency	n	%
Daily	16	11
At least once a week	66	45.2
At least once a month	24	16.4
At least once every 3 months	26	17.8
At least once a year	10	6.8
Less often than once a year	4	2.7

Table 5

Table 5. Type of Games Played

Game Type	n	% of sample (n=146)	% of total game types played (n=235)
FPS	107	73.29	45.53
MOBA	51	34.93	21.70
Fighting	19	13.01	8.09
RTS/Strategy	16	10.96	6.81
Card Games	13	8.90	5.53
Sports	11	7.53	4.68
Racing	4	2.74	1.70
Rocket League	3	2.05	1.28
Other	11	7.53	4.68

**Gaming Definitions: First Person Shooter (FPS), Multiplayer Online Battle Arena (MOBA), Real Time strategy (RTS)*

Table 6

Table 6. Factor Loadings

Item	Factor Loadings
7. Have you deceived any of your family members, therapists or others because the amount of your gaming activity?	.81
2. Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity?	.80
4. Do you systematically fail when trying to control or cease your gaming activity?	.79
6. Have you continued your gaming activity despite knowing it was causing problems between you and other people?	.78
9. Have you jeopardized or lost an important relationship, job or an educational or career opportunity because of your gaming activity?	.76
3. Do you feel the need to spend increasing amount of time engaged gaming in order to achieve satisfaction or pleasure?	.67
5. Have you lost interests in previous hobbies and other entertainment activities as a result of your engagement with the game?	.63
1. Do you feel preoccupied with your gaming behavior?	.60
8. Do you play in order to temporarily escape or relieve a negative mood (e.g., helplessness, guilt, anxiety)?	.55

Table 7

Table 7. IGD Prevalence Estimates

	IGDS9-SF ≥ 32		95% CI		APA	
	n	%	LL	UL	n	%
Overall Sample	17	11.64	0.07	0.18	5	3.42
Professional Esports Players	1	5.26	0.01	0.26		
Non-Professional Esports Players	16	12.60	0.07	0.20		

Table 8

Table 8. Logistic Regression Predictors

	B	SE	Wald	*df*	*P*	Odds Ratio	95% CI	
							LL	UL
WHODAS 2.0	0.165	0.047	12.354	1	<0.001	1.179	1.076	1.292
Age	0.114	0.112	1.037	1	0.308	1.121	0.900	1.398
K10	0.039	0.038	1.036	1	0.309	1.040	0.965	1.121
Average Gaming Related Spend	-0.002	0.002	0.752	1	0.386	0.998	0.995	1.002
Frequency of esports competitions	-0.180	0.273	0.434	1	0.510	0.835	0.489	1.427
Percentage of time on competitive gaming	0.002	0.012	0.024	1	0.877	1.002	0.979	1.025
Hours a week spent gaming	-0.002	0.019	0.008	1	0.928	0.998	0.962	1.035

Table 9

Table 9. Multiple Linear Regression Predictors

	B	*SE B*	Beta	T	P	95% CI	
						LL	UL
WHODAS 2.0	0.594	0.084	0.595	7.088	<0.001	0.429	0.760
Hours a week spent gaming	0.046	0.029	0.109	1.625	0.106	-0.010	0.103
K10	0.111	0.072	0.126	1.537	0.127	-0.032	0.254
Average Gaming Related Spend	-0.003	0.003	-0.061	-0.885	0.378	-0.008	0.003
Percentage of time on competitive gaming	0.002	0.018	0.007	0.114	0.909	-0.034	0.038
Frequency of esports competitions	0.019	0.423	0.003	0.044	0.965	-0.818	0.855

Figure 1

Figure 1. K10 Overall Score Distributions

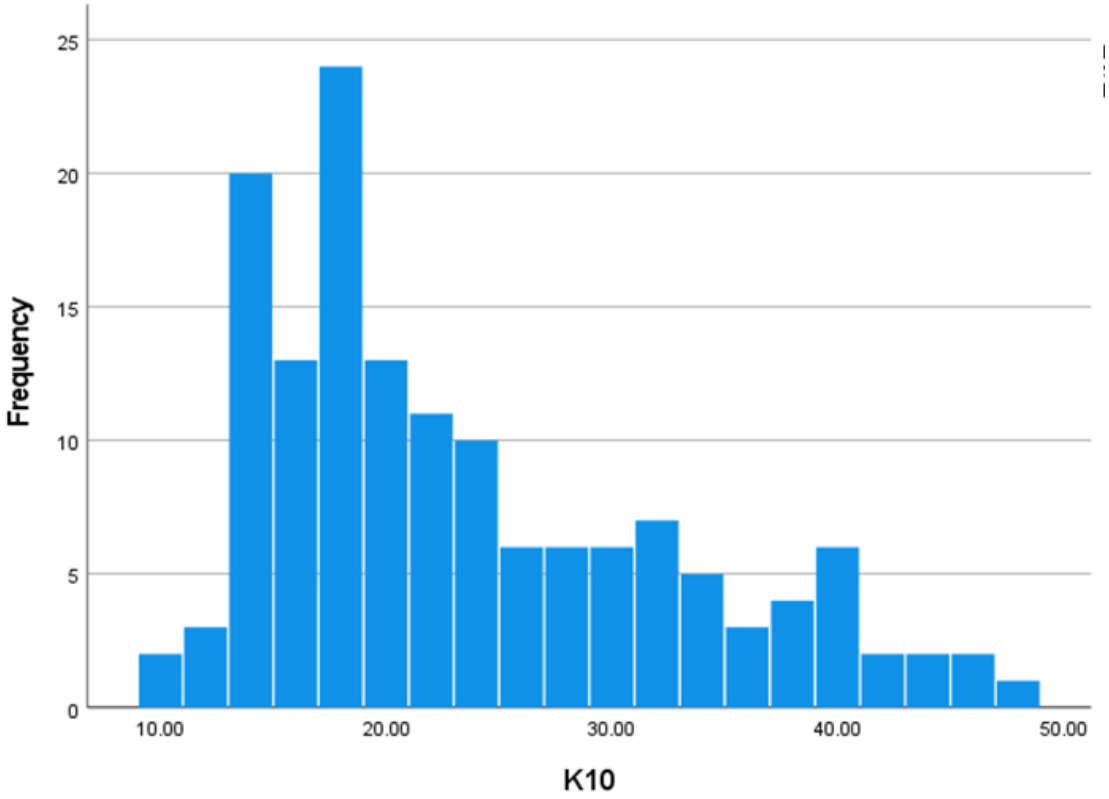


Figure 2

Figure 2. WHODAS 2.0 Overall Score Distributions

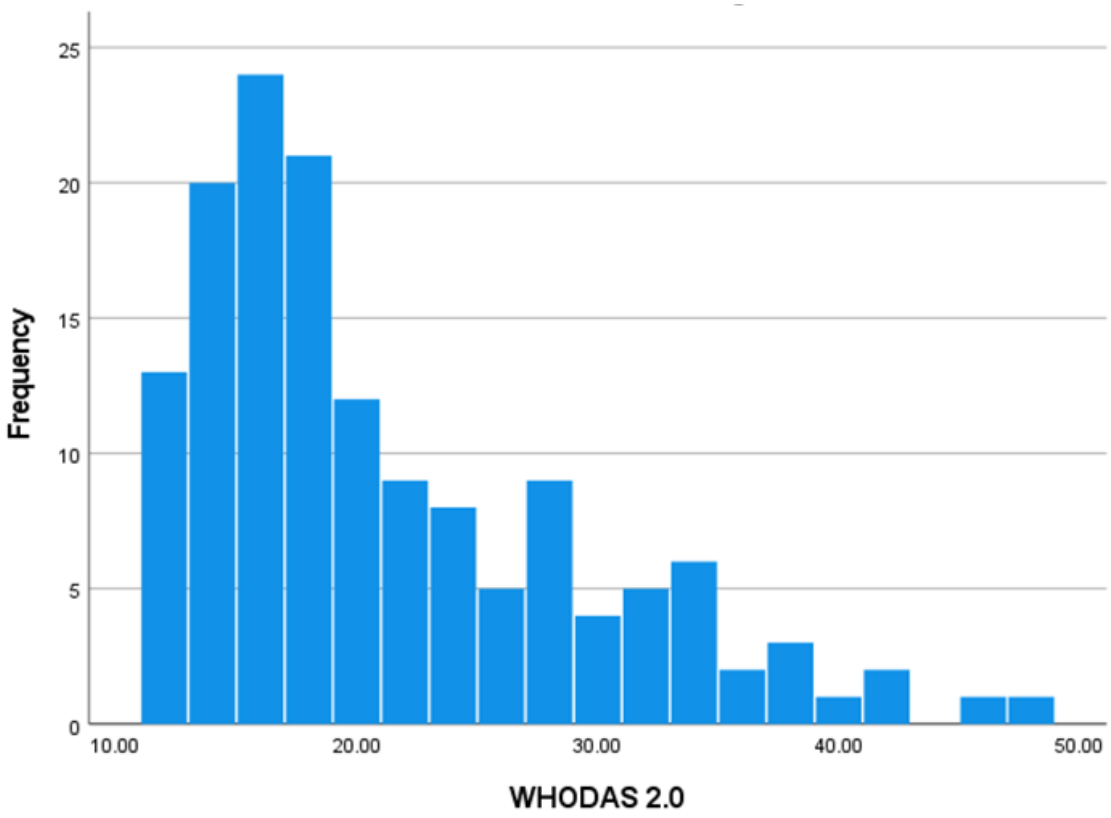


Figure 3

Figure 3. IGDS9-SF Overall Score Distributions

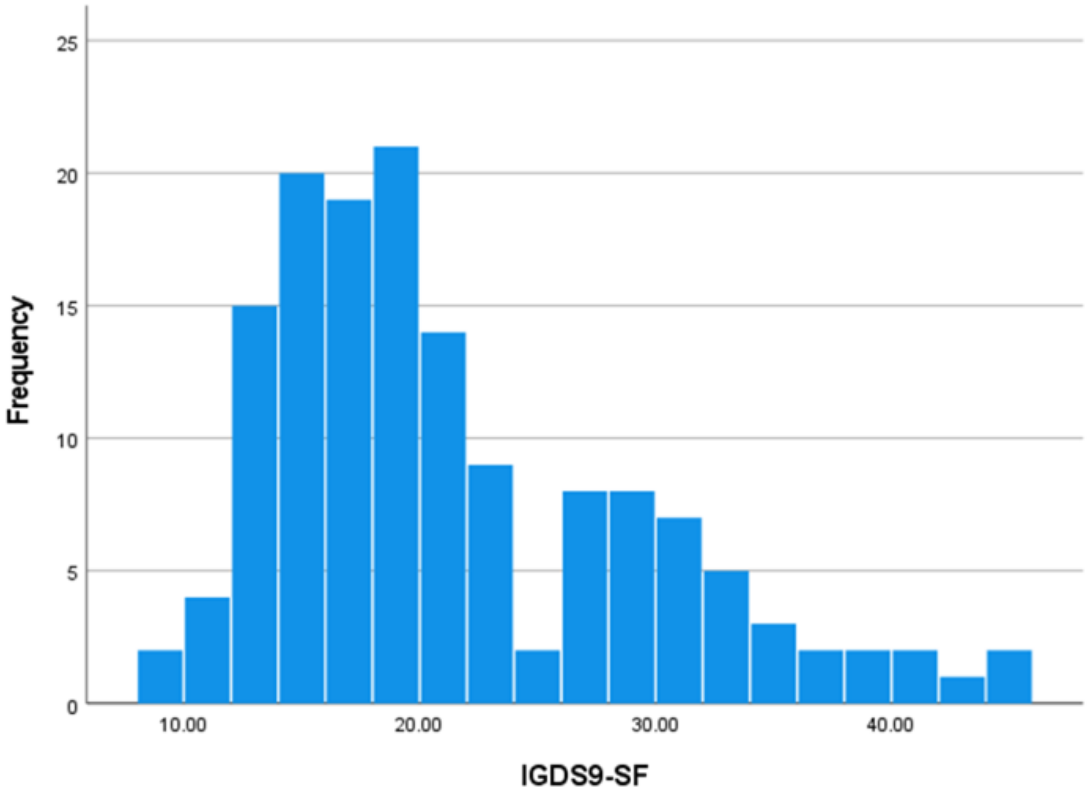
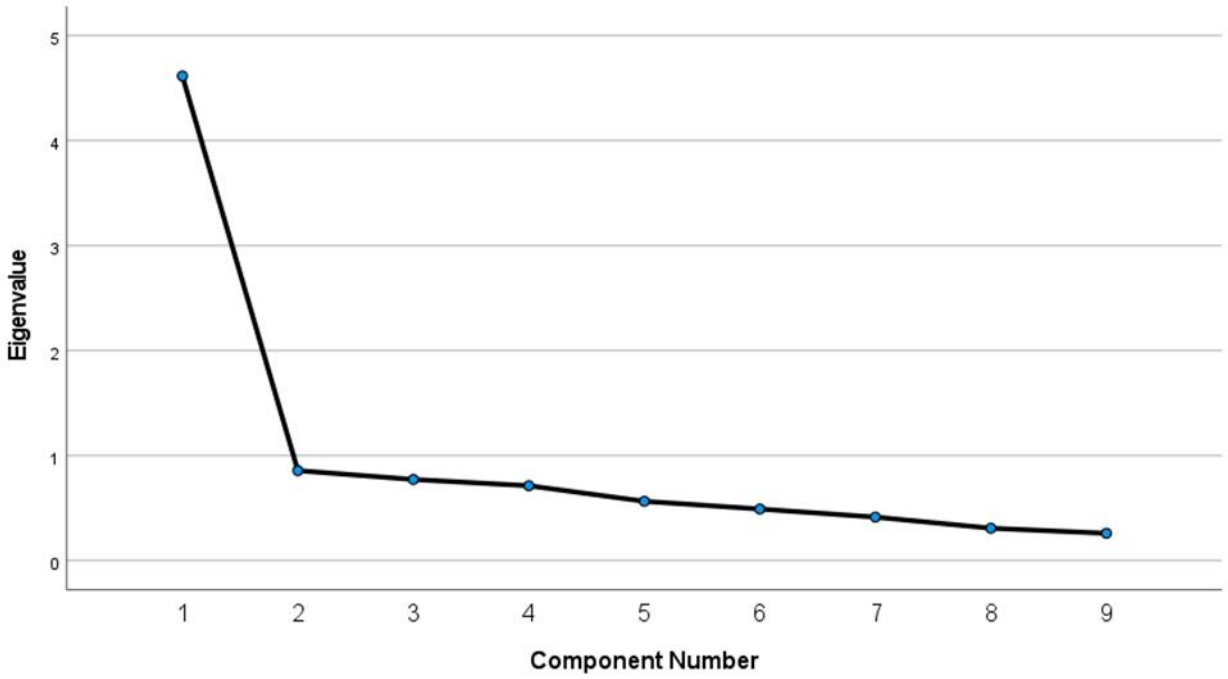


Figure 4

Figure 4. Exploratory Analysis Scree Plot



List of appendices

Appendix 1

SPSS Output

Spearman's Rank Correlations

Correlations

			IGDS9-SF	K10	WHODAS 2.0
Spearman's rho	IGDS9-SF	Correlation Coefficient	1.000	.467**	.646**
		Sig. (2-tailed)	.	.000	.000
		N	146	146	146
	K10	Correlation Coefficient	.467**	1.000	.625**
		Sig. (2-tailed)	.000	.	.000
		N	146	146	146
	WHODAS 2.0	Correlation Coefficient	.646**	.625**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	146	146	146

**. Correlation is significant at the 0.01 level (2-tailed).

Independent t-test K10 across IGD Cut off

Independent-Samples Mann-Whitney U Test Summary

Total N	146
Mann-Whitney U	438.000
Wilcoxon W	8823.000
Test Statistic	438.000
Standard Error	163.683
Standardized Test Statistic	-4.023
Asymptotic Sig.(2-sided test)	.000

Independent t-test WHODAS across IGD cut off

Independent-Samples Mann-Whitney U Test Summary

Total N	146
Mann-Whitney U	239.500
Wilcoxon W	8624.500
Test Statistic	239.500
Standard Error	163.600
Standardized Test Statistic	-5.238
Asymptotic Sig.(2-sided test)	.000

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.892
Bartlett's Test of Sphericity	Approx. Chi-Square	538.939
	df	36
	Sig.	.000

Component Matrix[a]

	Component 1
1. Do you feel preoccupied with your gaming behavior?	.601
2. Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity?	.799
3. Do you feel the need to spend increasing amount of time engaged gaming in order to achieve satisfaction or pleasure?	.677
4. Do you systematically fail when trying to control or cease your gaming activity?	.785
5. Have you lost interests in previous hobbies and other entertainment activities as a result of your engagement with the game?	.631
6. Have you continued your gaming activity despite knowing it was causing problems between you and other people?	.777
7.Have you deceived any of your family members, therapists or others because the amount of your gaming activity?	.812
8. Do you play in order to temporarily escape or relieve a negative mood (e.g., helplessness, guilt, anxiety)?	.553
9. Have you jeopardized or lost an important relationship, job or an educational or career opportunity because of your gaming activity?	.757

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

Overall IGD Prevalence

Confidence Interval Summary

Confidence Interval Type	Parameter	Estimate	95.0% Confidence Interval	
			Lower	Upper
One-Sample Binomial Success Rate (Clopper-Pearson)	Probability(IGD Cutoff=IGD Threshold Met).	.116	.069	.180

IGD Prevalence by esports status

Confidence Interval Summary

Confidence Interval Type	Parameter	Estimate	95.0% Confidence Interval	
			Lower	Upper
One-Sample Binomial Success Rate (Clopper-Pearson)	Probability(IGD Cutoff for Pros=IGD Threshold Met).	.053	.001	.260
One-Sample Binomial Success Rate (Clopper-Pearson)	Probability(IGD Cutoff for not pros=IGD Threshold Met).	.126	.074	.197

Independent t-tests K10 across esports status

Independent-Samples Mann-Whitney U Test Summary

Total N	146
Mann-Whitney U	1178.000
Wilcoxon W	9306.000
Test Statistic	1178.000
Standard Error	171.697
Standardized Test Statistic	-.166
Asymptotic Sig.(2-sided test)	.868

Independent t-tests WHODAS across esports status

Independent-Samples Mann-Whitney U Test Summary

Total N	146
Mann-Whitney U	1416.000
Wilcoxon W	9544.000
Test Statistic	1416.000
Standard Error	171.611
Standardized Test Statistic	1.221
Asymptotic Sig.(2-sided test)	.222

Independent t-tests IGDSF-9 across esports status

Independent-Samples Mann-Whitney U Test Summary

Total N	146
Mann-Whitney U	1338.500
Wilcoxon W	9466.500
Test Statistic	1338.500
Standard Error	171.639
Standardized Test Statistic	.769
Asymptotic Sig.(2-sided test)	.442

Chi Squared esports status across IGDS9-SF Cut off

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.864[a]	1	.353		
Continuity Correction[b]	.298	1	.585		
Likelihood Ratio	1.032	1	.310		
Fisher's Exact Test				.700	.314
Linear-by-Linear Association	.858	1	.354		
N of Valid Cases	146				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.21.
b. Computed only for a 2x2 table

Logistic Regression

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	71.826[a]	.204	.397

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	7.108	8	.525

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	33.226	7	<.001
	Block	33.226	7	<.001
	Model	33.226	7	<.001

Classification Table[a]

Observed			Predicted IGD Cutoff		
			IGD Threshold Not Met	IGD Threshold Met	Percentage Correct
Step 1	IGD Cutoff	IGD Threshold Not Met	125	4	96.9
		IGD Threshold Met	13	4	23.5
	Overall Percentage				88.4

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	How many years old are you?	.114	.112	1.037	1	.308	1.121	.900	1.398
	5. How many hours a week do you spend gaming? - Gaming	-.002	.019	.008	1	.928	.998	.962	1.035
	6. What percentage of your weekly time gaming is dedicated to competitive gaming (i.e. training, coaching, competitions)? - Week dedicated to competitive gaming	.002	.012	.024	1	.877	1.002	.979	1.025
	7. How often do you engage with esports competitions?	-.180	.273	.434	1	.510	.835	.489	1.427
	8. How much money do you spend on average each month on gaming related activities (Please specify your currency)?	-.002	.002	.752	1	.386	.998	.995	1.002
	K10	.039	.038	1.036	1	.309	1.040	.965	1.121
	WHODAS 2.0	.165	.047	12.354	1	<.001	1.179	1.076	1.292
	Constant	-8.973	2.860	9.844	1	.002	.000		

a. Variable(s) entered on step 1: How many years old are you?, 5. How many hours a week do you spend gaming? - Gaming, 6. What percentage of your weekly time gaming is dedicated to competitive gaming (i.e. training, coaching, competitions)? - Week dedicated to competitive gaming, 7. How often do you engage with esports competitions?, 8. How much money do you spend on average each month on gaming related activities (Please specify your currency)?, K10, WHODAS 2.0.

Multiple Linear Regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.688[a]	.474	.451	5.89707	1.002

a. Predictors: (Constant), 8. How much money do you spend on average each
month on gaming related activities (Please specify your currency)?, 7. How often do you engage with esports
competitions?, 6. What percentage of your weekly time gaming is dedicated to competitive gaming (i.e. training, coaching, competitions)? - Week dedicated to competitive gaming, K10, 5. How many hours a week do you spend gaming? - Gaming, WHODAS 2.0
b. Dependent Variable: IGDS9-SF

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4349.041	6	724.840	20.843	<.001[b]
	Residual	4833.788	139	34.775		
	Total	9182.829	145			

a. Dependent Variable: IGDS9-SF

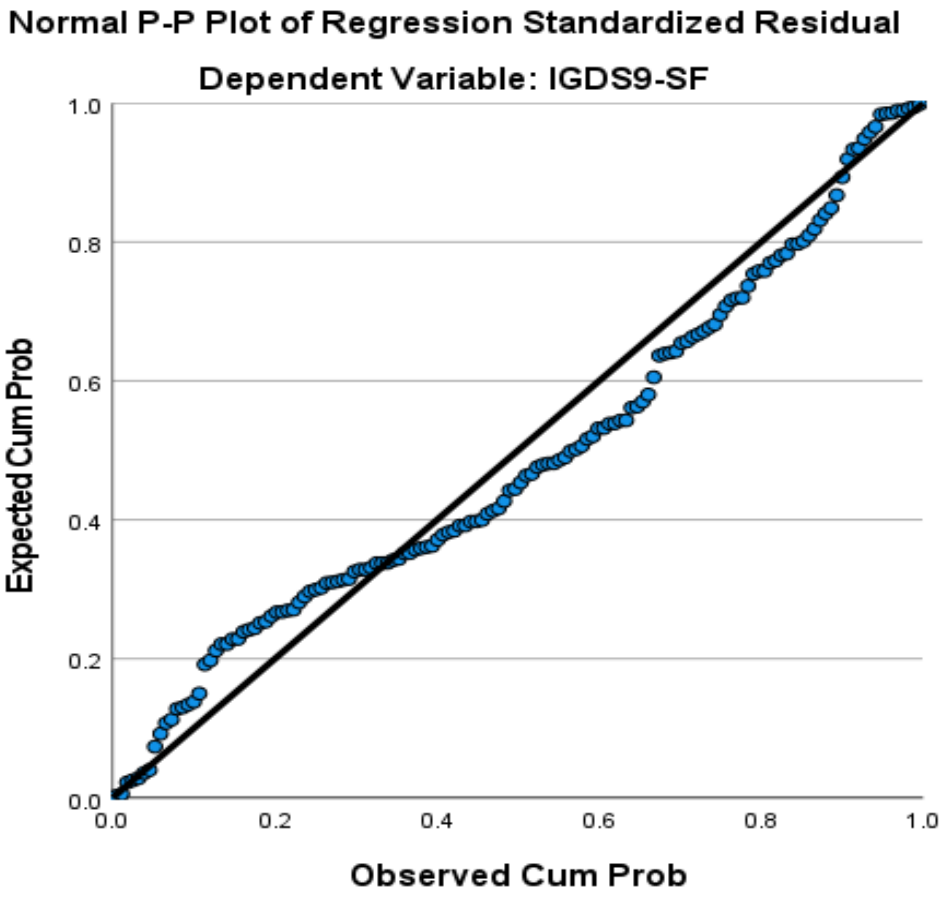
b. Predictors: (Constant), 8. How much money do you spend on average each
month on gaming related activities (Please specify your currency)?, 7. How often do you engage with esports
competitions?, 6. What percentage of your weekly time gaming is dedicated to competitive gaming (i.e. training, coaching, competitions)? - Week dedicated to competitive gaming, K10, 5. How many hours a week do you spend gaming? - Gaming, WHODAS 2.0

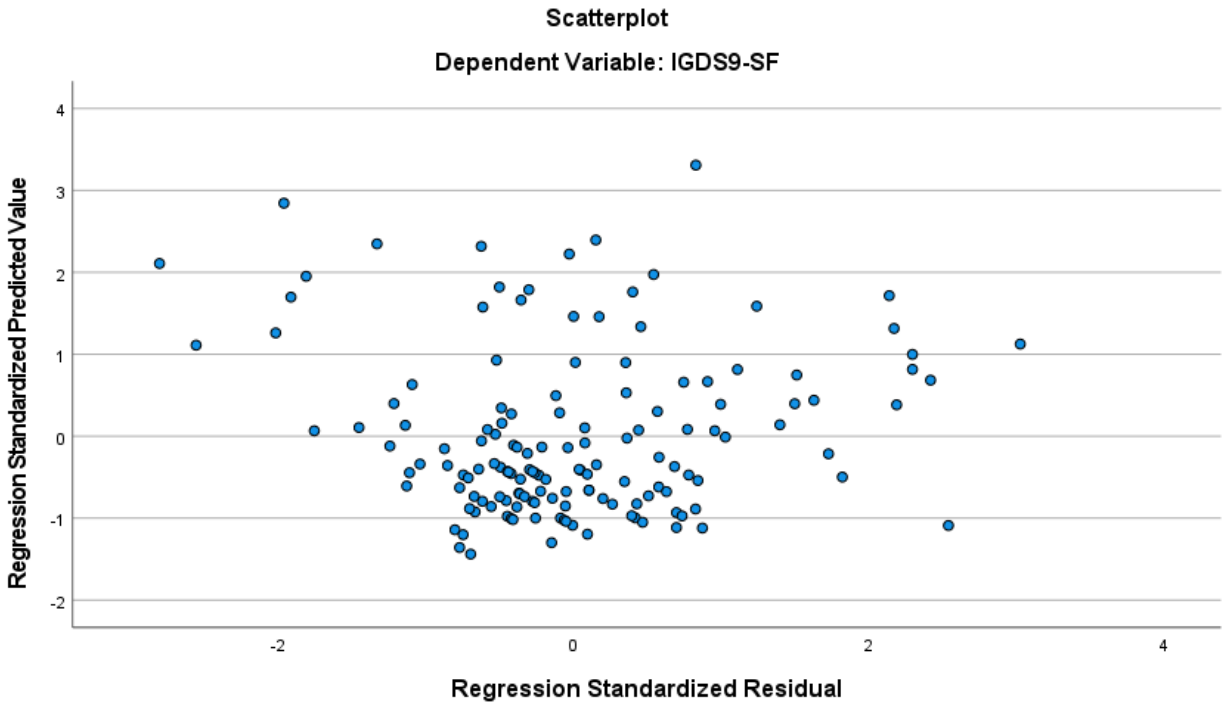
Coefficients[a]

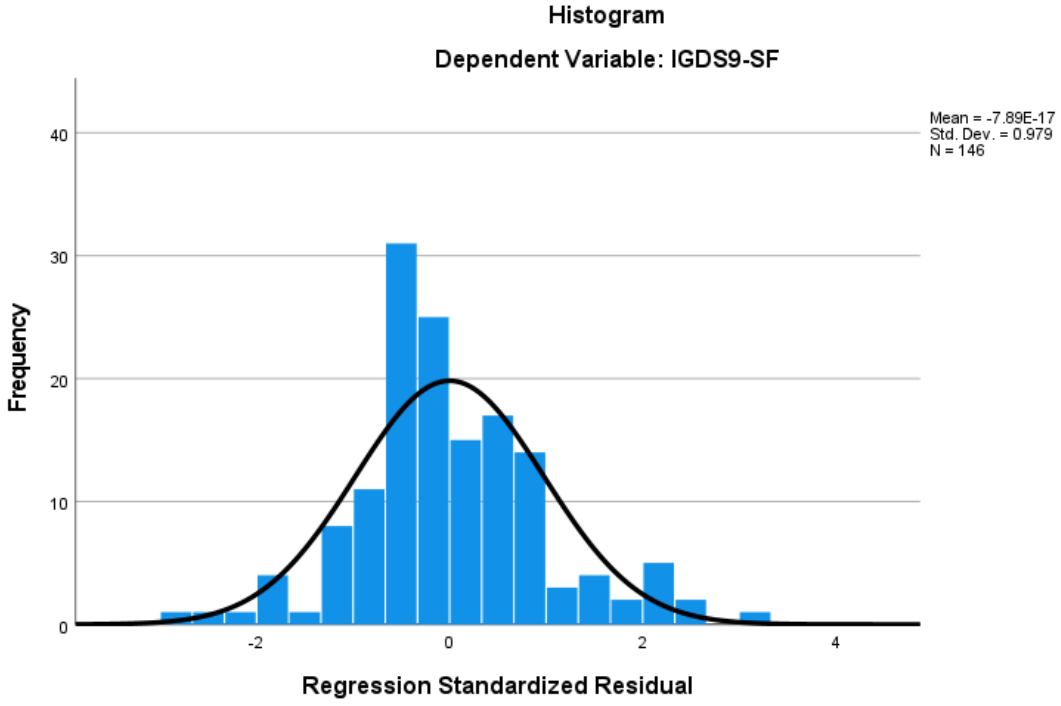
Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	4.547	2.052		2.216	.028	.489	8.604		
	WHODAS 2.0	.594	.084	.595	7.088	<.001	.429	.760	.537	1.864
	K10	.111	.072	.126	1.537	.127	-.032	.254	.564	1.774
	5. How many hours a week do you spend gaming? - Gaming	.046	.029	.109	1.625	.106	-.010	.103	.848	1.179

6. What percentage of your weekly time gaming is dedicated to competitive gaming (i.e. training, coaching, competitions)? - Week dedicated to competitive gaming	.002	.018	.007	.114	.909	-.034	.038	.915	1.093
7. How often do you engage with esports competitions?	.019	.423	.003	.044	.965	-.818	.855	.879	1.138
8. How much money do you spend on average each month on gaming related activities (Please specify your currency)?	-.003	.003	-.061	-.885	.378	-.008	.003	.784	1.275

a. Dependent Variable: IGDS9-SF


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: IGDS9-SF
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: IGDS9-SF
Regression Standardized Predicted Value
Regression Standardized Residual
4
3
2
1
0
-1
-2
-2
0
2
4


Histogram
Dependent Variable: IGDS9-SF
Mean = -7.89E-17
Std. Dev. = 0.979
N = 146
Frequency
Regression Standardized Residual
40
30
20
10
0
-2
0
2
4

Appendix 2

Esports Questionnaire

These questions aim to gather information about your personal characteristics, gaming habits and esports identity. Please answer these questions in relation to your identity and activity in the last 12 months.

1) Do you identify as any of the following? (Please select one).
    - Professional esports player (An individual with a work contract for an esports team).
    - Non-professional esports player (An individual without an esports contract who has the relevant games skills/status and participates in esports events.)
    - A casual gamer (An individual who plays games, and may watch esports, but does not participate in esports competitions.)
    - Not a gamer (An individual who does not regularly or at all play games).
2) What is your date of birth (DOB)?
3) Can you read fluently in any of the following languages?
    - English
    - None of the above
4) What gender do you identify as?
    - Male
    - Female
    - Non-Binary
    - Prefer not to answer
    - Prefer to self-identify _____
5) How many hours a week do you spend gaming?
6) What percentage of you weekly time gaming is dedicated to competitive gaming (i.e. training, coaching, competitions)?
7) How often do you engage with esports competitions?
    - Daily
    - At least once a week
    - At least once a month
    - At least once every 3 months
    - At least once a year
    - Less often than once a year
8) How much money do you spend on average each month on gaming related activities (Please specify your currency)?
9) What gameplay types do you engage with during esports events?
    - First-person Shooter/Shooter
    - Sports
    - Fighting
    - MOBA (Multiplayer Online Battle Arena)
    - Card Games
    - Teal-time Strategy/Strategy
    - Other
10) Which of the following ways are you most likely to engage in esports events?
    - Individual events
    - Team events
    - Even mix of individual and team events
11) Do you believe that your video gaming behaviour is problematic?
    - Strongly Agree
    - Agree
    - Disagree

- Strongly Disagree

12) Regardless of your answer to the previous question, do any of your significant others believe your video gaming behaviour is problematic?
    - Strongly Agree
    - Agree
    - Disagree
    - Strongly Disagree

Appendix 3

09 February 2021

Dear Ryan,

EGA ref: FHMS 20-21 016 EGA

Project Title: Validation of the diagnostic criteria of Internet Gaming Disorder in the DSM-V among the esports community

On behalf of the Ethics Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the submitted protocol and final supporting documentation listed in the table below.

Date of confirmation of ethical opinion: **09th February 2021**

This opinion is given on the understanding that you will comply with the relevant University policies, ethical and professional standards and any applicable regulatory requirements, and have completed all mandatory training provided by the University of Surrey.

If the project includes distribution of a survey or questionnaire to members of the University community, researchers are asked to include a statement advising that the project has been reviewed by the University's Ethics Committee.

Please follow guidelines below and note that all research activity must comply with current University guidance regarding the Covid19 pandemic:

https://www.surrey.ac.uk/coronavirus/researchers/research-university-ethics-committee-approval

If you wish to make any changes to the Protocol for this project, now or later, other than those permitted in the guidance provided in the above link, you must submit a Notification of Amendment form before any changes can be implemented. Please refer to the Guidance on Amendments which can be found on the Research Integrity and Governance Office webpages. Please note that the governance approval of this project is valid until the study end date provided.

Please be aware that the Committee will need to be notified of any incidents, deviations from protocol or adverse events that may potentially impact the research participants or your data integrity, and if the study is terminated earlier than expected with reasons. You should do this by contacting ethics@surrey.ac.uk. Please be advised that the Ethics Committee and/or RIGO can audit research projects to ensure that researchers are abiding by the University requirements and guidelines.

This favourable ethical opinion is valid for the duration of the project. If you require an extension to the study end date, you must submit a notification of amendment. Please note that if the study is not completed within five years of the above date, you will be required to submit a new application to the Ethics Committee.

Please notify RIGO (ethics@surrey.ac.uk) when the research has been completed.

The final list of documents reviewed by the Committee is as follows:

Document	Version	Date
SAGE pdf - 640816-640807-65979000	N/A	07th Oct 2020
EGA Form	0.1	16th Oct 2020
Protocol	1.2	16th Nov 2020
Participant Information Sheet	1.4	21st Dec 2020
Consent Form	1.2	16th Nov 2020
K10 test – submitted 22nd Dec 2020	N/A	N/A
Poster	1.0	22nd Dec 2020
Questionnaire - IGDS9-SF - submitted 22nd Dec 2020	N/A	N/A
Esports Questionnaire	1.0	16th Nov 2020

Yours sincerely

Research Integrity and Governance Co-ordinator

Appendix 4

To access the study, use this link or the QR code above:
https://surreyfahs.eu.qualtrics.com/jfe/form/SV_40XiASUmenVBzmd

Internet gaming disorder (IGD) in the esports community.

Recently, several medical organizations (American Psychiatric Association & World Health Organization) have introduced the concept of internet gaming disorder (IGD). IGD being an addiction to computer games. The concept of IGD is currently still a draft version and is open to critique and change.

There is some debate among academics about the accuracy of this concept, particularly when applied to those who compete in esports. We hope this study will help to provide further insight into the concept of IGD.

The study consists of 4 brief online questionnaires that will take no longer than 15mins to complete.

Participation could potentially help us to:

- Critique the criteria for having internet gaming disorder
- Reduce stigma associated with gaming/esports
- Safeguard esports players from IGD
- Provide a basis for further research into the esports community and/or IGD

Location

- This study can be accessed online through the link/QR code above, from any internet enabled device. Including but not limited to IOS, Android and Windows systems.

Are you eligible?

- 16 years or older
- Professional or non-professional esports player
- Can read/write in English

If you're unsure if you meet the requirements, email a member of the study team:

- Ryan Woolhouse (MSc)
- Principal Researcher
- r.woolhouse@surrey.ac.uk

Please feel free to share this with anyone who you feel may be eligible and would like to take part.

UNIVERSITY OF SURREY

Appendix 5

INFORMED CONSENT FORM

Thank you for considering taking part in this research.

Please read this form after you have read the Information Sheet about the research.

Title of Study: Validation of the diagnostic criteria of Internet Gaming Disorder in the DSM-V among the esports community.

University of Surrey Ref: FHMS 20-21 016 EGA
If you have any questions about the Information Sheet, please email the researcher (below) before you make your decision. You can download a copy of this Consent Form and the Information Sheet to keep and refer to at any time.

By pressing the **submit** button at the end of this survey you are consenting to take part in this study. If the submit button is not pressed or the survey is only partially complete this will mean that you DO NOT agree to taking part in that study and that your data will be ineligible for this study.

Taking part in the study means:	
	Statement
1	I confirm that I have read and understood the participant information sheet dated 21/12/2020 (v1.4) for the above study. I have had the opportunity to consider the information and asked questions which have been answered satisfactorily.
2	I understand that my participation is voluntary and that I am free to withdraw at any time during the study without giving any reason. Furthermore, I understand that data already collected can only be withdrawn up to one month after completion of the study (January 1st, 2022).
3	I understand that information I provide may be subject to review by responsible individuals from the University of Surrey and/or regulators for monitoring and audit purposes.
4	I agree to take part in this study.
5	I understand that information I provide will be used in various anonymised outputs, including a written report, publication and presentation.
6	I understand that my personal data, including this consent form, which link me to the research data, will be kept securely in accordance with data protection guidelines, and only be accessible to the immediate research team or responsible persons at the University.
7	I understand any personal contact details collected about me, such as date of birth, will not be shared beyond the study team.
8	I consent to the processing of my special category data (health information) for the purposes stated in the information sheet.

Appendix 6

PARTICIPANT INFORMATION SHEET

Title of Study: Validation of the diagnostic criteria of Internet Gaming Disorder in the DSM-V among the esports community

University of Surrey Ref: FHMS 20-21 016 EGA

PLEASE KEEP A COPY OF THIS INFORMATION SHEET FOR YOUR RECORDS

Section: Taking Part

Invitation Paragraph

We would like to invite you to participate in this research project conducted by postgraduate researcher Ryan Woolhouse (Doctorate of Clinical Psychology at the University of Surrey). Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. This document contains all of the information required to help you make that decision. You should only participate if you want to. Choosing not to take part will not disadvantage you in any way. If you have any questions, you can contact us using the contact details at the end of this information sheet. You are free to discuss this study with others as you see fit.

What is the purpose of the study?

It was recently decided that addiction to games may be a medical condition. This condition was named internet gaming disorder or IGD for short. This study is looking to see whether the proposed “symptoms” of having IGD are accurate for people who play esports. We plan to test this by seeing if people who engage with esports score high for both symptoms of IGD and levels of distress.

If results find that people who engage with esports score high for the symptoms of IGD but low for distress, this might suggest that the list of symptoms created for the diagnosis of IGD may not be accurate, or that those in the esports community have particular characteristics/environments that protect them from getting IGD, both are ideas we would like to explore further.

If it shows that people who engage with esports score high for the symptoms of IGD and high for distress, we would like to establish the percentage of esports players who potentially have IGD and what characteristics made them more or less likely to have IGD (i.e. professional or non-professional esports player).

This will involve the completion of one demographic questionnaire, one measure of IGD and two measures of distress and disability

Who is responsible for this study?

This study is the responsibility of Ryan Woolhouse, Dr Bob Patton and Dr Thornsten Barnhofer at the University of Surrey.

Why have I been invited to take part?

You are invited to participate in this study because you have been considered to be part of the esports community. To be eligible to take part in this study, you must be over 16 years old, read fluently in English or Mandarin and be either a professional or non-professional esports player (as defined below).

Professional esports player: An individual with a work contract for an esports team.

Non-professional esports player: An individual without an esports contract who has the relevant games skills/status and participates in esports events.

Do I have to take part?

Participation is voluntary and you do not have to take part. We will describe the study in this information sheet, and you have until the study's closing date (January 1st, 2022) to decide whether you wish to take part in this study and complete the survey. Please contact us if there is anything that is not clear, if you have any questions, or if you would like more information (contact details are provided at the end of document).

What will happen to me if I decide to take part?

If you decide to take part, you will be asked to download and keep this information sheet and accompanying consent form. We will then ask you to complete four questionnaires online via the Qualtrics software.

The first questionnaire is a self-report measure to gather personal information about yourself and your gaming habits. The second questionnaire is the Kessler 10 scale (K10) which is a brief measure of psychological distress. The third questionnaire is the Internet Gaming Disorder Scale 9 (IGDS9-SF), a brief measure of symptoms of IGD. The final questionnaire is the World Health Disability Assessment Schedule 2.0 (WHODAS), a brief measure of health and disability.

We expect it will take no longer than 15 minutes to complete all four questionnaires. All questions on each questionnaire are compulsory, you will be unable to move through to the next questionnaire until all questions are answered. Any incomplete surveys will be considered to be a sign that you have not given consent for your data to be used in the main findings of this study.

The results from your questionnaires, in combination with those of other participants, will be combined and analysed. You will be requested to provide your gender as well as your date of birth to confirm your age. A unique identifying number will be assigned to you which must be used when contacting the principal investigator, Ryan Woolhouse, to request a withdrawal of your data. By default, the Qualtrics software will also collect your IP address and location based on that IP address, enabling you to save your content and return back to the questionnaire at a later date. All this information is considered as personal information and will be kept strictly confidential, only accessed by members of the research team or members of the University responsible for auditing and/or monitoring purposes.

What happens if I do not want to take part or if I change my mind?

If you wish to withdraw, data already collected can only be withdrawn up to one month after the study's closing date (January 1st, 2022). After this point, your data will be combined with others and can no longer be removed. In order to request a withdrawal of data, please email the principal researcher (Ryan Woolhouse) with your date of birth and unique identifying number. Incomplete surveys or removal of data consent will result in the deletion of all your personal data.

What are the possible benefits of taking part?

Whilst there are no immediate benefits for you participating in the project, it is hoped that this work will have numerous potential benefits for both the scientific and esports community.

1. The criteria for IGD is currently a draft version, meaning it is open to development and change. Further research on IGD could help ensure that the criteria is accurate and accounts for different gaming groups.
2. If the research finds a link between esports participation and IGD it would help to provide a basis to further investigate how to better safeguard the esports community against IGD.
3. Alternatively, the research might reveal that the current IGD criteria does not accurately assess those in the esports community. This could potentially open a discussion about developing more suitable criteria, reduce potential stigma associated with gaming and provide a basis to investigate how esports players are already protected against IGD.

Are there any potential risks involved?

As part of this study you will be asked to complete several questionnaires about your physical and mental health, which may prompt small levels of distress or anxiety. In order to reduce any potential levels of distress and help manage with any difficulties that may occur, we have provided links to mental health support websites at the end of this information sheet.

As with any research, there is a very small and unlikely risk that you will be identified. To minimise this risk, we have requested for a minimal amount of personal information your date of birth, gender, IP address and we also assigned to you a unique identifying number (i.e. no names or contact details). All data is anonymised and stored securely. Results will not report any direct or indirect identifiable information.

How is the project being funded?

This research is a student project as part of the Doctorate of Clinical Psychology at the University of Surrey and is ~~thus~~ funded by the University of Surrey.

Will my participation be kept confidential?

We are responsible for making sure that your participation is kept confidential. All data is kept secure and used only in the way described in this information sheet. All of the information that we collect about you during the course of the research will be kept strictly confidential and only accessed by members of the research team or responsible members of the University for auditing and/or monitoring purposes. You will not be able to be identified in any ensuing reports or publications. All personal information that could identify you (unique identifying number, gender, IP address and date of birth) will be removed, aggregated or changed before information is shared with researchers or results are made public.

Will my data be shared or used in future research studies?

We would like your permission to use your anonymised data in future research studies, and to share data with other researchers (e.g. in online databases). All information will be anonymous before being shared with other researchers or results are made public. This information may be subject to review by responsible individuals from the University of Surrey and/or regulators for monitoring and audit purposes.

What will happen to the results of the study?

We will produce a final report summarising the main findings of the study. We will also look to publish the main results from the research study in a peer reviewed scientific journal and present these results at conferences. Any reports and published findings will not include any 'personal data' that could identify you. We aim to complete the research study by summer 2022. You can contact the research team (contact details at the bottom of this information sheet) between June-September 2022 quoting your date of birth and unique identifying number to request a copy of the main findings.

Who has reviewed this study?

This research has been reviewed by an independent group of people, called an Ethics Committee. This study was reviewed and given a favourable ethical opinion by the University of Surrey Ethics Committee.

Section: Your personal data

What is personal data?

'Personal Data' refers to any information that identifies you as an individual. We will be collecting and using some of your personal data that is relevant to completing the study.

This study collects your date of birth, gender and IP address. It also provides you with a unique identifying number, all of above are classified as 'personal data' under GDPR guidelines. We also collect physical/mental health information which is regarded as a 'special category personal data'. We will use this information as explained in the 'What is the purpose of the study' section above.

Who is handling my personal data?

The University of Surrey, who has the legal responsibility for managing the personal data in this study, will act as the 'Data Controller' for this study. The research team will process your personal data on behalf of the controller and are responsible for looking after your information and using it properly.

What will happen to my personal data?

As a publicly funded organisation, we have to ensure that when we use **identifiable personal information** from people who have agreed to take part in research, that this data is processed fairly and lawfully. The University of Surrey processes personal data for the purposes of carrying out research in the **public interest** and special category data is processed on an additional condition necessary for **research purposes.** This means that when you agree to take part in this research study, we will use and look after your data in the ways needed to achieve the outcomes of the study.

Your personal data will be held and processed in the strictest confidence, and in accordance with current data protection regulations. When acting as the data controller, the University will keep identifiable information about you until September 2022, after which time any identifiers will be removed from the aggregated research data.

Although this study is open to overseas participants, it should be noted that the transfer of your information to the UK will not compromise your confidentiality and will be in line with the strict UK data protection Laws.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. If you decide to withdraw from the study, we may not be able to withdraw your data. We will keep and use the minimum amount of personally identifiable information about you that we have already obtained in order to complete the study.

If you wish to make a complaint about how we have handled your personal data, you can contact our Data Protection Officer, Suzie Mereweather, who will investigate the matter (dataprotection@surrey.ac.uk). If you are not satisfied with our response or believe we are processing your personal data in a way that is not lawful, you can complain to the Information Commissioner's Office (ICO) (https://ico.org.uk/).

You can find out more about how we use your information https://www.surrey.ac.uk/information-management/data-protection and/or by contacting dataprotection@surrey.ac.uk .

Section: Further information

What if you have a query or something goes wrong?

If you are unsure about something, you can contact the research team for further advice using the contact details at the bottom of this information sheet.

However, if your query has not been handled to your satisfaction, or if you are unhappy and wish to make a formal complaint to someone independent of the research team, then please contact:

Research Integrity and Governance Office (RIGO)
Research and Innovation Services
University of Surrey
Senate House, Guildford, Surrey, GU2 7XH
Phone: +44 (0)1483 689110
Email: rigo@surrey.ac.uk

The University has in place the relevant insurance policies which apply to this study. If you wish to complain or have any concerns about any aspect of the way you have been treated during the course of this study, then you should follow the instructions given above.

Who should I contact for further information?

The research team consists of principal investigator, Ryan Woolhouse (Trainee Clinical Psychologist, Surrey University, r.woolhouse@surrey.ac.uk), Dr Bob Patton (Lead for the Drugs, Alcohol & Addictive Behaviours Research Group, University of Surrey) and Dr Thornsten Barnhofer (Professor of Clinical Psychology, University of Surrey).

For further information about the research, please contact the principal investigator, Ryan Woolhouse, using the contact details given above.

What can I do if I am concerned about my mental wellbeing?

Below we have included a link to Checkpoint. Checkpoint are a charity run by both mental health and game industry professionals, who provide mental health resources for gamers and the gaming community globally.

https://checkpointorg.com/about-page/

https://checkpointorg.com/global/

Below we have provided further links to mental health support websites for English speaking countries:

Australia

https://www.yourhealthinmind.org/

Canada

https://cmha.ca/

USA

https://www.nami.org/Home

UK

https://www.rethink.org/

New Zealand

https://www.mentalhealth.org.nz/

South Africa

https://www.safmh.org/

For those whose first language is Mandarin you can access information on mental health difficulties through the links below:

https://www.rcpsych.ac.uk/mental-health/translations/chinese/mental-health-information

Alternatively, if you reside in China and would like to access mental health support please follow the guidance on the National Health commission of the People's Republic of China and access your local healthcare system or psychological helplines.

http://www.nhc.gov.cn/

Thank you for reading this information sheet and for considering taking part in this research.

All translated versions of this document have either been completed or checked by someone independent of the research team to ensure the translation is accurate.

Part 2
Literature Review

Autism Spectrum Condition (ASC) and Internet Gaming Disorder (IGD): A scoping review.

By

Ryan Woolhouse

Submitted in partial fulfilment of the degree of Doctor of Psychology (Clinical Psychology)

School of Psychology

Faculty of Health and Medical Sciences

University of Surrey

4th April 2022

Abstract

As of 2014 there has been a growing area of research focused on the comorbidities linked to Internet Gaming Disorder (IGD); however, there has been little research focussing on the interaction between IGD and Autism Spectrum Conditions (ASC). This scoping review aims to review the current research concerning the association between IGD and ASC. Specifically, the prevalence and psychopathology of IGD in the ASC community. Literature was identified through a search of CINAHL, Cochrane Library, PubMed and Web of Science. The results of the review suggest that those with higher autistic traits are more likely to meet diagnostic criteria for IGD. The implications and directions for future research and clinicians as a result of these findings are discussed.

Introduction

Autism spectrum condition (ASC) has one of the highest prevalence's of all neurodevelopmental disorders (Dietert, Dietert & DeWitt, 2011) with an estimated worldwide prevalence of one in every 270 people (World Health Organisation [WHO], 2021). Autism is characterised by persistent difficulties in social interactions accompanied by repetitive and restricted activities, interests, or behaviours (American Psychological Association [APA], 2013). Deficits in social interactions are attributed to decreased processing speed (Haigh et al., 2018), difficulties with executive functioning (Miranda et al., 2017), theory of mind and pragmatic competence (Berenguer et al., 2018). Restricted and repetitive behaviours are either categorised as repetitive motor movements often as a response to manage with the different sensory profiles experienced by those with autism (Lam, Bodfish & Piven, 2008) or with higher order behaviours involving stringent routines or engagement with highly fixated interests (Szatmari et al. 2006).

Evidence has shown that autistic individuals are increasingly more likely to engage with screen-based activities, including video games. Autistic children are involved with screen-based activities more frequently than their non-autistic peers (Orsmond & Kuo, 2011), and engage with video games for nearly twice as long (Mazurek & Engelhardt, 2013). In contrast to non-autistic adults, autistic adults spend 1.76hrs more per day playing video games and use 26.77% more of their free time playing video games (Engelhart, Mazurek & Hilgard, 2017). It is not uncommon for some restricted interests to be more typical in the autistic community (Caldwell-Harris & Jordan, 2014), it is likely that the popularity of these activities change over generations, with video games potentially being a new typical restricted interest. Alternatively, these behaviours could be seen as an increased vulnerability to the addictive nature of gaming, with studies finding autistic individuals are more likely to exhibit pathological symptoms of

gaming (Engelhart, Mazurek & Hilgard, 2017) and symptoms of problematic internet use (PIU; A maladaptive preoccupation with internet use that causes impairment) (de Vries et al., 2018).

The overuse of video games and concerns about the addictive nature of these games has been a growing concern as the popularity and accessibility of video games increases (Griffith, Kuss & King, 2012). As of 2014, Internet Gaming Disorder (IGD) was added to the Diagnostic and Statistical Manual 5th Edition (DSM-V) as a condition warranting further research (Petry et al., 2014). Internet Gaming Disorder is categorised by a pattern of persistent and recurrent gaming behaviour (online or offline) which leads to significant impairment in family, social, personal, occupational, or other important areas of life (APA, 2013). Currently, prevalence rates vary across studies, with rates ranging from 0.21-57.5% in general populations and 3.2-91% in clinical populations (Darvesh et al., 2020). The variability in these reported results is most likely due to the lack of standardised measures used across studies with 35 different methods used to diagnose IGD as the community develops a consensus on how to best assess IGD (Darvesh et al., 2020).

The proposed DSM-V diagnostic criteria for IGD bear a striking similarity to the manner in which autistic individuals choose to engage with activities, in this case video games. Autistic individuals are often less socially engaged than their non-autistic peers (Travis & Sigman, 1998) and may prefer individual activities at the expense of those with others. Furthermore, autistic individuals often spend extended periods of time engaged with very specific interests and activities and may become distressed when unable to perform behaviours associated with these interests (Rodgers et al., 2012). These behaviours can differ from the social expectations of non-autistic individuals (Perepa, 2014), and can be interpreted as difficult or challenging instead of different (Dyches et al., 2007), resulting in the masking of these behaviours leading to further psychological distress (Hull et al., 2017). If the autistic individual's special interest were gaming, the above behaviours could be interpreted as meeting

any of the following IGD criteria depending on the context presented: 1) high pre-occupation with gaming, (2) withdrawal symptoms, (3) increase in tolerance to gaming, (4) unsuccessful attempts to stop or reduce gaming, (5) loss of interest in other activities or hobbies, (6) excessive gaming despite negative consequences, (7) deceiving others about gaming activities, (8) using gaming to escape/relieve negative moods, and (9) losing or jeopardising relationships, job or educational/career opportunities (APA, 2013). These overlapping characteristics between restricted interests, social differences and IGD criteria may lead to an inflated diagnosis of IGD for autistic individuals or highlight an increased vulnerability of developing IGD (Coutelle et al., 2021)

Autistic individuals are already at an increased risk of psychiatric comorbidities due to the social difficulties, rigid thinking and emotional regulation difficulties associated with pervasive developmental disorders (PPD). Identifying the correct diagnosis of these comorbidities can be extremely complex (Krueger & Markon, 2006). In comparison to the general population, autistic individuals are 70% more likely to have at least one other psychiatric diagnosis (Abdallah et al., 2011; Kaat, Gadow, & Lecavalier, 2013; Simonoff et al., 2008). When diagnosing these comorbidities, it is important to be aware of referral biases, overlapping diagnostic criteria and artificial subdivision of syndromes that could present with a false picture of comorbidity (Caron and Rutter, 1991). Thus, a strong understanding of the specific symptom expression of IGD in relation to autism are crucial in providing the correct diagnosis and treatment (Deprey & Ozonoff, 2018).

The existing literature highlights the vulnerability of autistic individuals to develop psychiatric comorbidities, the similarities between behavioural addiction and autism diagnostic criteria and the increase prevalence of gaming behaviours in the autism community. Thus, it is crucial to explore the literature on IGD and autism. The association between autism and IGD is currently an emerging field of research and as such, there is currently a paucity of existing

papers. Peters et al. (2015) suggest that when attempting to identify gaps in research and clarify concepts in broad or emerging fields a scoping review is the most appropriate methodological approach. A scoping review is a form of literature review which aims to identify a broad research question across many different study designs, regardless of the quality of those studies (Arksey & O'Malley, 2005).

Objectives

The aim of this review is to provide an overview of the existing literature related to IGD and autism by compiling and evaluating studies reporting the prevalence of IGD in the autism population and the psychopathology (causes, development, and outcomes) of IGD in the autism population. Specifically, we sought to answer the following questions:

1. What is known about the psychopathology of IGD in autism?
2. What is known about the prevalence of IGD in the autism population?

Method

The methodology for this paper has been based on the Preferred Reporting items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews Guidelines (PRISMA-ScR; Tricco et al., 2018). This review includes all 20 essential reporting items set out by the PRISMA-ScR guidelines. Both optional items, which aim to critique the quality of articles, were not included as they are beyond the scope of this study (Peters et al., 2021).

Inclusion criteria

Eligible studies referenced a diagnosis of autism or autistic traits in relation to IGD and were written in English. Studies mentioning an association between IGD and autism where their primary focus was not on this interaction were also included.

Exclusion criteria

Studies failing to discuss both autism and IGD were excluded, as were studies where results for IGD were not distinguished from other addictive disorders (i.e., internet addiction, problematic gaming). Studies that did not use outcome measures or psychiatric interviews informed by all nine of the IGD criteria suggested by the DSM-V (APA, 2014) were also excluded (King et al., 2020).

Search method

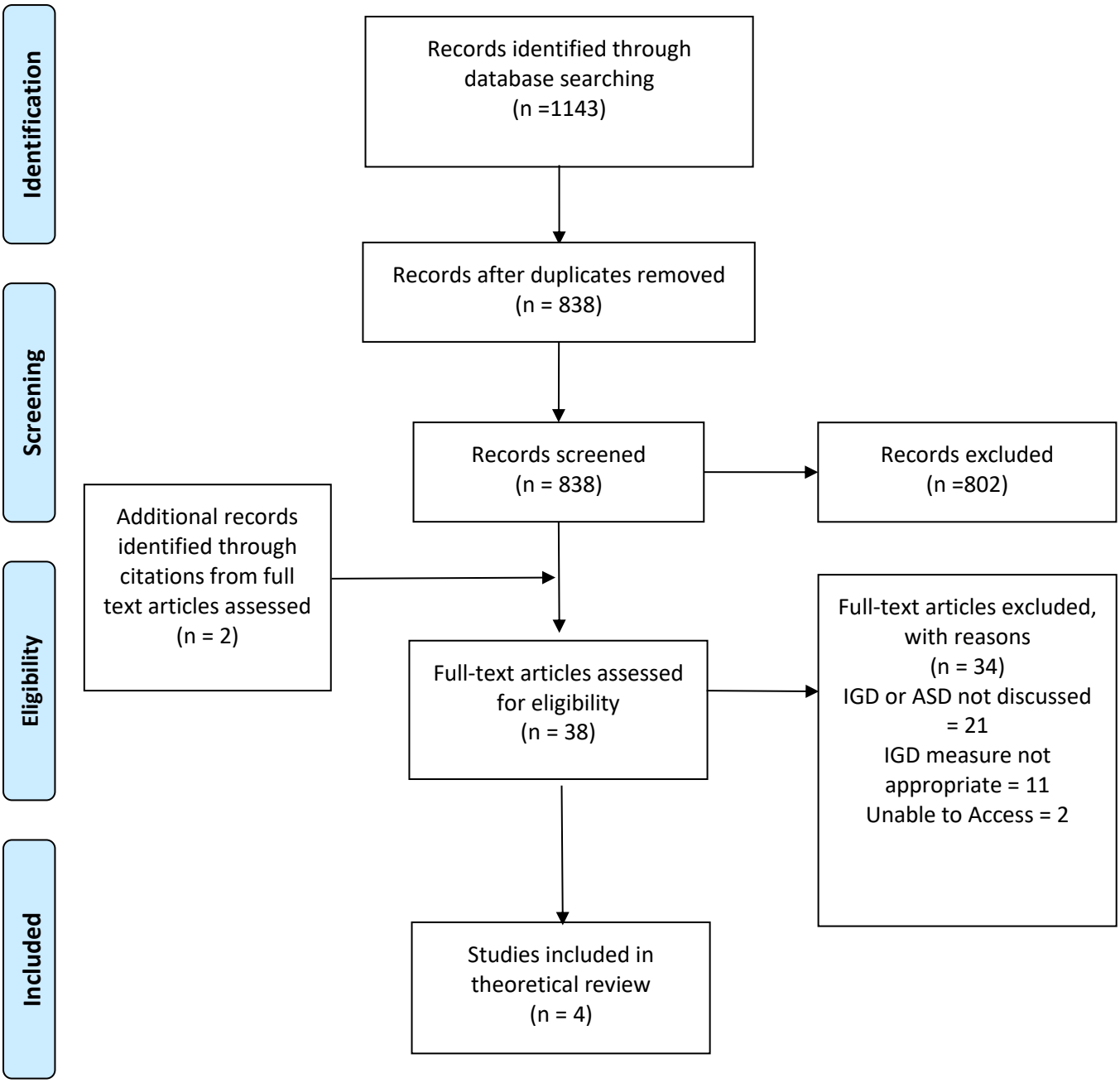
Electronic searches of four online databases were carried out in November 2021: CINAHL, Cochrane Library, PubMed and Web of Science, retrieving 437, 62, 154, and 492 studies, respectively. The keyword search used to identify studies consisted of two parts (IGD and autism), and identified terms present in either title, abstract or keyword lists of studies. Due to the inconsistency in terminology of IGD the first part of the search terms was replicated from Paulus et al., (2018): ((pathological gaming OR computer games OR video games OR online games OR Internet games OR internet gaming) AND (abuse OR addiction OR compulsive OR dependence OR dependency OR disorder OR effects OR excessive OR habits OR misuse OR pathological OR problem OR problematic)). The second part consisted of: (autistic spectrum* OR autism spectrum* OR Asperger* OR autism OR ASD OR ASC).

Selection of sources of evidence

A PRISMA flow diagram representing the process for the selection of sources of evidence can be seen in Figure 1. From the initial electronic searches 1143 articles were identified. After the removal of 305 duplicate articles, the titles, and abstracts of the remaining 838 articles were screened. At this stage, 36 articles appeared to be eligible for inclusion and were subject to full text reviews, with two further articles identified through citations from the first full text review article. Thirty-four articles were excluded during this process, resulting in

4 articles being included in the final review. The 38 full text reviews were conducted independently by both authors. Any disagreements were resolved through discussion.

Figure 1. *Flow chart of search strategy based on PRISMA flow diagram.*



Data items and charting process

Both authors agreed on the data extraction categories informing the creation of the data extraction chart (see Table 1). The first author completed the data extraction of the included studies with the second author independently reviewing the inclusion of these results, with any disagreements solved verbally. No online protocol exists for this study.

Results

Please see Table 1 for more information on study design, population/sample, diagnostic tools, aims and key relevant findings. All studies chosen for this review were published between 2017 and 2021 with 75% being published in the last 3 years. All four studies (100%) were quantitative with none of the studies collecting qualitative data. Two (50%) of the studies employed a correlational research design, and the remaining two (50%) employed a cross-sectional design.

Three (75%) of the studies assessed IGD using self-report measures (IGDS9-SF & IGDT-10) and one study used a parent-report measure (YC-CGD). Two studies (50%) used a psychiatric diagnosis of autism, with three studies (75%) using variations of the Autism Spectrum Diagnostic Quotient to determine autistic traits.

Three (75%) of the studies were conducted with European participants, with one (25%) study using a worldwide sample of which 90.8% were from a western country. The total number of participants from the studies reviewed (where this data was available) is 5,100, with 82.02% identifying as male, 17.39% identifying as female, 0.39% identifying as non-binary and 0.2% unsure of their gender identity. Two (50%) of the studies reported having a higher number of female participants, one study (25%) reported a higher number of male participants and one (25%) only used male participants.

Table 1. *Summary of key findings for included studies*

Author	Study Design	Population/Sample	Diagnostic Tools	Main Objectives	Key Relevant Findings
Arcelus et al. (2017)	Cross-sectional	Self-selection invitation to transgender adults accessing health services. Transgender Adults accessing healthcare service in the United Kingdom (N=245). 35.1% male, 44.8% female, 7.3% non-binary and 3.7% not sure. Mean age = 27.41. Race/ethnicity and SES not reported.	IGD = IGDS9-SF (Pontes & Griffiths, 2015) Autism = Autism Spectrum Quotient 29 (AQ-28) (Hoekstra et al., 2008)	To describe gaming behaviour, degree of problematic gaming behaviour and associated factors with problematic gaming in a comparatively large group of transgender people accessing transgender health services	A significant positive correlation between total AQ-28 ($r = .37$, $p < .007$), problems socialising ($r = .19$, $p < .001$), interpersonal problems ($r = .45$, $p < .001$) and IGD score. Autism scores were not a significant predictor for IGD in their multiple linear regression model. Interpersonal problems were a significant predictor of IGD in this model ($b=3.18$, $p<.001$).
Concerto et al. (2021)	Cross-sectional	Self-selection and snowball sampling through social media. Italian gamers between 18-55 years old (N=4260). 84.13% male and 15.87% female. Age, race/ethnicity, and SES not reported.	IGD = IGDS9-SF (Pontes & Griffiths, 2015) Autism = Autism Spectrum Quotient (AQ) (Baron-Cohen et al., 2001)	To measure the prevalence of IGD in an adult population of video game players and to investigate the association between demographic variables, autism traits, Attention-Deficit Hyperactivity Disorder (ADHD) severity, and IGD in adults.	A higher AQ total score was associated with a higher IGD total score. Total AQ score accounted for 9.1% of the variation in IGD ($F(64,270) = 94.7$, $p < 0.0001$).

Table 1. *(Continued)*

Author	Study Design	Population/Sample	Diagnostic Tools	Main Objectives	Key Relevant Findings
Murray et al. (2021)	Cross Sectional design	Self-selection and snowball sampling through social media, posters and student autism research group. Worldwide Adults with ASD (N=230) Worldwide adult comparison (N=272). Age, gender, race/ethnicity, and SES not reported.	IGD = Internet Gaming Disorder Test (IGDT-10; Király et al., 2017) Autism=Psychiatric diagnosis Autism Spectrum Quotient 10-items (AQ-10; Allison et al., 2012).	To examine the relationship between autism and IGD. To investigate the predictors of IGD in participants with and without autism, including social functioning, extraversion, emotional regulation, and peer attachment. To evaluate if IGD and gelotophobia are related to each other.	9.1% of the autism group and 2.9% of the comparison group scored over the cut-off for IGD. Significant difference ($F(1, 501) = 21.42$, $p < 0.001$) in the number of IGD symptoms reported between the ASD group ($M = 0.28$, $SD = 0.29$) and TD group ($M = 0.17$, $SD = 0.25$). Extraversion accounted for 6% of the variation in IGD (($F(1,484) = 29.28$, $p < 0.001$) across groups. Peer attachment (social functioning) accounted for 5% of the variance in IGD ($F(3,481) = 10.04$, $p < 0.001$) across groups. Emotional regulation accounted for 1% of the variance in IGD ($F(2,479) = 3.45$, $p = 0.033$) across groups. Social functioning accounted for 1% of the variation in IGD ($F(1,478) = 4.42$, $p = 0.036$) across groups.

Table 1. *(Continued)*

Author	Study Design	Population/Sample	Diagnostic Tools	Main Objectives	Key Relevant Findings
Paulus et al. (2019)	Cross Sectional design	Self-selection from two autism mental health services. German Adolescents males diagnosed with ASD currently accessing mental health services (N=62). Mean age = 12. German adolescent males' comparison group (N=31). Mean age = 11.5 Race/ethnicity and SES not reported.	IGD = Young Children-Computer Gaming Disorder Questionnaire (YC-CGD; Paulus et al., 2018) Autism = Psychiatric Diagnosis	To investigate how children and adolescents with autism make use of computer gaming and computer-mediated communication (CMC) in comparison to their non-autistic peers	84% of autistic boys usually played alone compared to 66% of the non-autistic group. Autistic boys were 4.29 times more likely to play games alone. Autistic boys were less likely to play in the company of friends 24% vs 48% than comparisons. Autistic boys were significantly less likely to play multiplayer modes than comparisons (U(N=54, N= 29,) =618.5,z=-1.75, p=0.44). Autistic boys (85 min, SD = 11.4) play games for significantly longer than non-autistic comparisons (M = 50.1 min, SD = 8.1) (t(80) = –2.46, p =.008, d = .48). Autistic boys (M = 0.71, SD = 0.62) have significantly higher rates of IGD non-autistic comparisons (M = 0.38, SD = 0.30) (t(90) = –3.52, p < .001, d = .62). Autistic boys scored significantly higher on social problems, thought problems, social withdrawal, and attention problems (statistics not reported).

What is known about the prevalence of IGD in the ASD population?

Murray et al. (2021) were the only study to report a prevalence rate of IGD in their autistic population. They found that 9.1% (n=21) of the autistic sample and 2.9% (n=8) of the non-autistic sample reported symptoms above the cut-off for IGD. Meeting IGD criteria in this study was defined by an individual endorsing (scoring "often") five or more of the nine APA diagnostic criteria of IGD on the IGDT-10.

Two studies reported that their autistic groups reported significantly more symptoms of IGD, on IGD measures than comparison groups (Murray et al, 2021; Paulus et al, 2019).

Two studies reported a significant positive relationship between scores on the autism and IGD measures (Arcelus et al., 2017; Concerto et al., 2021). However, one study found that autism scores were not a significant predictor for IGD in their multiple linear regression model (Arcelus et al., 2017).

What is known about psychopathology of IGD in the ASD population?

Both cross sectional studies investigated mood and cognitive factors that could also contribute to IGD. One study reported that extraversion negatively predicted IGD and that decreased cognitive appraisal, alienation and better social functioning positively predicted IGD (Murray et al, 2021). The other study reported that autistic individuals scored highest on social problems, thought problems and attention problems (Paulus et al, 2019).

One study also explored the difference in gaming habits between autistic and non-autistic groups. They reported that autistic boys played games alone more often (84% vs 66%), played less in the company of friends (24% vs 48%) and were significantly less likely to play multiplayer modes, use communication mediated communication (CMC) and played for significantly longer than comparisons (M=85min vs M=50.1min) (Paulus, et al., 2019).

Discussion

Association between ASD and IGD

Both studies reporting correlational statistics found a significant positive correlation between autistic traits and IGD (Arcelus et al., 2017; Concerto et al., 2021). Similarly, a systematic review of autism and behavioural addictions (including previous conceptualisations of IGD) found that in 83% of cases there was a positive correlation between autistic traits and addictive behaviours, 50% of which reported a significant positive correlation (Kervin et al., 2021). These results support previous findings that autistic traits correlate with symptoms of behavioural addiction and specifically IGD.

However, contrary to these results, Arcelus et al. (2017) found that autism trait scores were not a significant predictor for IGD in their multiple linear regression model. This result could be explained the by the specific population group for this study. This study used a transgender population who are thought to use gaming in a more functional manner to safely explore their gender identity in a less stigmatising online environment, resulting in a reported IGD rate of 0.7% (Arcelus et al., 2017). This lower rate of IGD and potential different use of gaming are variables that could have impacted on the interaction between autism and IGD and thus this result may not be generalisable to cisgender autistic populations.

Group Differences

Both studies utilising comparison groups found that autistic individuals reported significantly more symptoms of IGD than non-autistic comparisons (Murray et al, 2021; Paulus et al, 2019). These results are in line with similar findings that autistic individuals also report higher levels of problematic video gaming (Craig et al., 2021) and PIU (Normand et al., 2021). These preliminary findings suggest that autistic individuals may experience greater symptoms

of IGD as defined by current DSM-V conceptualisation of IGD than the non-autistic population.

Prevalence

Only one study provided an estimate of IGD in adult autistic individuals, which was 9.1% (Murray et al., 2021). Other studies investigating this relationship using previous conceptualisations of gaming disorder have reported similar findings of 8% (Engelhardt et al., 2017). Murray et al. (2021) also reported that the estimated prevalence of their comparison group was 2.9%. Similar to the prevalence rate of 2% found in a population of 418 non-autistic European gamers (Laconi et al., 2017). These results along with similar studies suggest that the prevalence rate of IGD among the autistic population may be higher than the non-autistic population.

There is currently no clear consensus on the best psychometric measure for IGD (King et al., 2020). Furthermore, there is no clear consensus on the best way to interpret measures, with some studies opting to use endorsement of five of the nine IGD criteria as a definition for meeting IGD, with others using an overall clinical cut-off score (Poon et al., 2021). This lack of consensus has resulted in vastly different prevalence estimations across populations (Darvesh et al., 2020). Therefore, although Murray et al (2021) highlights a potential difference in prevalence of IGD in autistic and non-autistic populations the overall prevalence numbers for this population should be interpreted with caution.

Psychopathology of IGD

None of the studies reported on potential causes, development and outcomes of IGD in the autistic community, highlighting the need for more qualitative and longitudinal studies to better understand the psychopathology of IGD in autistic individuals. However, several studies reported on potential associates and predictors of IGD in the autistic community.

Two studies investigated mood and cognitive factors that may also be predictive of IGD. Murray et al. (2021) reported that those who are more introverted, experience more alienation from peer groups and have lessened cognitive reappraisal abilities were more likely to have IGD. All three of these factors have been shown to have increased prevalence in the Autistic population (Bölte, Dickhut, & Poustka, 1999). Those in the autistic population are more likely to be seen as introverted (Kentile, 1994) and experience rejection from non-autistic peers due to their social communication differences (de Boer & Pijl, 2016). Individuals with autism are also more likely to have less cognitive flexibility and are more likely to experience alexithymia resulting in overall lower cognitive reappraisal abilities (Albein-Urios et al., 2018; Kinnaird, Stewart & Tchanturia, 2019). This is further supported by the findings of Paulus et al. (2019) who reported that the autistic group in their IGD study had higher levels of social and thought difficulties. These findings suggest that the environmental interaction between the cognitive and social difficulties experienced by those with autism may make them more vulnerable to developing IGD.

Contrary to previous findings (Miraha & Hugchi, 2017), Murray et al. (2021) also found that better social functioning predicted higher IGD scores. However, this finding was a very weak predictor and only accounted for a small amount of variance in IGD scores and thus variance in IGD may be better explained by other variables. This variance could also be accounted for by the variation in measures of social functioning used across studies. Murray et al. (2021) used a specific social functioning measure (SFQ) in comparison to previous studies who have focused on subcomponents of social functioning (i.e., social problems, social withdrawal and introversion) (Miraha & Hugchi, 2017**).**

One study also reported on game playing habits that might contribute to the risk of developing IGD. Paulus et al. (2019) found that autistic individuals were more likely to play alone and less likely to engage with online multiplayer modes. These findings have been

similarly reported in studies regarding media and video game use in the autistic population (Kuo et al., 2014; Mazurek & Wenstrup, 2013). This individualistic preference for video game use could be a reflection of the social communication difficulties often experienced by individuals with autism (Baron-Cohen & Wheelwright, 2004). These difficulties can often result in difficulty establishing friendships or experiencing peer rejection, potentially explaining why autistic individuals opt to play alone in comparison to non-autistic peers (de Boer & Pijl, 2016; Kargas, Lopez, Morris & Reddy, 2016). Alternatively, this could be a reflection of the method in which those with autism prefer to engage with their restricted interests, often choosing lone engagement over engagement with peers (Kangas, Määttä & Uusiautti, 2012).

This may also explain why autistic individuals were reported to play for significantly longer than non-autistic comparisons. With some studies showing that increased playing time have been associated with increased levels of PVG in non-autistic populations (Cudo et al., 2018). However, this increased play time may again also be a reflection of the restricted interests of autistic individuals. As autistic individuals have been shown to have a particular affinity for interests in computers/video games (Kuo et al., 2014) and will often engage with restricted interests for longer periods of times in comparison to the hobbies of their non-autistic peers (Leekam, Prior & Uljarevic, 2011).

Quality Appraisal

Contrary to systematic reviews, scoping reviews are designed to provide an overview of the entirety of existing evidence regardless of the quality of studies, to map literature in emerging fields (Peters et al., 2015). As such this review included no formal assessment of the methodological quality of studies included in this review, and thus we are unable to assess the rigor or quality of studies included. Therefore, although the studies included are all from peer-

reviewed journals the methodology may be poorly conducted or skewed with bias and should be interpreted with caution.

Limitations and Strengths

To the authors' best knowledge, this is the first review to only include studies that have clearly adhered to the DSM-V criteria for assessing IGD, allowing for a reliable comparison and collation of results using standardised criteria (First et al., 2014) in a field in which there have been numerous iterations of the conceptualisation and measurement of IGD (Király, Griffiths & Demetrovics, 2015).

The main limitation of this review is the paucity of studies included. Although the current studies provide an insight into the relationship between IGD and autism, it is hard to draw definitive conclusions from such a sparse amount of data, particularly outside of a western population. As such these results may not be generalisable or representative of a wider autistic population.

It is also possible that this review does not contain all relevant published materials. Two studies identified as potentially contributing to the research area were unable to be reviewed due to lack of access and subsequent unsuccessful attempts to contact the authors. Also, only studies written in English were included, potentially limiting the available suitable studies.

This lack of available evidence however highlights the importance of the timing of this study, providing early identification of research gaps and synthesis of ideas. Early identification is key in informing future methodology, while maximising innovation and avoiding duplication in emerging research fields (Maggio, Sewell & Artino, 2016).

All the studies included in this review employed cross-sectional study designs. These study designs mean that it is difficult to infer causality from the results of these studies.

Consequently, we are unable to definitively explain the direction of the associations between variables in these studies.

Implications for Future Research

First, the paucity of research included in this review highlights the need for the future study of the DSM-V conceptualisation of IGD through validated measures in those with ASD. Eleven of the studies explored during the full text reviews were excluded as they either did not use an assessment tool that covered all nine DSM-V criteria for IGD or did not differentiate IGD data from other disorders (with eight of these studies being published after the introduction of the DSM-V criteria for IGD). If the validity for the DSM-V criteria and cut-offs for IGD are to be validated for the autistic population then future research will need to specifically measure IGD in line the with criteria set out by the DSM-V. This is crucial to allow for future studies to investigate if the DSM-V IGD measures distinguish between IGD and repetitive interests/restricted behaviours.

Research is required to examine and report the prevalence rates of IGD in the autistic population. Only one of the four studies included in this research reported the prevalence rates of IGD in autistic individuals. It would be helpful to include these statistics in future research.

This review found evidence of increased prevalence rates of IGD in autistic individuals and correlations between IGD and autism measures that may suggest autistic individuals are more likely to meet diagnostic criteria for IGD. However, there is no research available exploring the underlying mediating mechanisms behind this relationship. Future research should explore the psychological and biological mechanisms underlying the relationship between IGD and autism.

Demographic variables of these studies were skewed heavily towards autistic individuals from Western societies who identified as being male. In order for the concept of IGD to be validated, future research should consider diversifying its sample populations.

Finally, this review highlights the lack of available research on the development and consequences of IGD on the autistic population. Qualitative and longitudinal studies could be utilised to create a better understanding of the psychopathology of IGD in autistic populations.

Implications for Clinical Research

Autistic traits seemingly correlate with the DSM-V criteria of IGD, and autistic individuals may have higher prevalence rates of IGD. However, the current evidence does not clarify whether autistic individuals are genuinely more at risk of developing IGD or more at risk of being misdiagnosed with IGD due to overlapping autistic traits. Misdiagnoses of IGD in autism could inadvertently result in the stigmatisation and reduction of an individual's restricted interest in video games resulting in a negative impact on mental health (Gunn & Delafiel-Butt, 2016; Mancil & pearl, 2008). As a result, clinicians should not currently base diagnostic or screening assessments solely on the use of IGD outcome measures for autistic individuals. Outcome measures should be administered alongside clinical assessments administered by clinicians with a good understanding of both IGD and autism to avoid misdiagnosis.

Conclusions

These findings suggest that autistic traits are positively correlated with measures of IGD and that the prevalence of IGD may be higher in the autistic population. However, the current evidence does not establish whether this link is causal. The findings of this review highlight significant gaps in the literature on the psychopathology, prevalence rates and mediating factors of IGD in the autistic population and the pressing need for more research to be conducted in

these areas. The findings of this review also highlight the current complexity of assessing IGD in the autistic population for clinicians.

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Part 3
Clinical Experience

Year One - Core Adult Placement (12 months)

Adult Community Mental Health Team (CMHT)

My first placement on clinical training was at Community Mental Health Team. This role involved completing psychological assessments, formulations and interventions for adults aged 18-65 who resided in the local community. The service predominately offered cognitive behavioural therapy (CBT) for a wide array of mental health conditions. As part of this placement, I completed over 200 hours of individual CBT for numerous different conditions. As part of the work with my clients I also worked closely with their psychiatrists, care co-ordinators, support workers and external services (i.e., Social Care). Outside of direct therapeutic work I created and presented a workshop to a local carers group, designed materials for the transition to online therapies, coproduced a presentation for CCG funding and redesigned the therapy waiting lists. During this placement I also completed by Service Evaluation Project which evaluated the treatment of PTSD within the local CMHT's and used as part of the evidence for developing new trauma pathways within the trust.

Year Two - Core Child Placement (6 months)

Child and Adolescent Mental Health Team (CAMHS) Tier 2

Child and Adolescent Mental Health Team (CAMHS) Looked After Children (LAC)

My second placement on clinical training was a split placement between a Tier 2 CAMHS Service and a CAMHS looked after children team. The Tier 2 service worked with children and young people from the age of 8-18. The service predominately offered CBT to children and families. During the placement I completed numerous interventions adapting CBT for individual work with young people and for parents. I coproduced and presented two

different CBT groups, one for parents with anxious children and another for adolescents with low mood. I also completed a neuropsychological assessment for a child with suspected learning difficulties (Weschler Intelligence Scale for Children, WISC-V) and provided feedback to the family. The LAC team worked with parents, social workers and young people aged 0-25 who had been placed in foster or adoptive care. This service focused on offering trauma informed individual work to young people of trauma-informed consultations for social workers and foster/adoptive parents. Furthermore, the LAC team also had its own care home in which I designed and presented training on non-violent residence for the new care home staff.

Year Two - Core Older Adult Placement (6 months)

Older Adult Community Mental Health Team (OACMHT)

My third placement on clinical training was at a local Older Adult Community Mental Health Team. This role involved completing psychological assessments, formulations, and interventions for adults aged 65+ who resided in the local community. At the service I offered individual CBT and acceptance and commitment therapy (ACT) to older adults managing with an array of mental health conditions. I also provided neurological assessments for dementia (ACE III, TOPF, WAID, WMS & Hayling & Brixton) along with systemic plans for maintaining the quality of life of these individuals and to help family, carers, and care homes to manage challenging behaviours. I also coproduced and presented a psychoeducational CBT coping skills for clients and their carers. This service also involved working closely with psychiatrists, care co-ordinators and support workers to help coordinate the care of those experiencing cognitive decline.

Year Three - Core Learning Difficulties & Specialist Placement (Twelve Months)

Complex Autism Service

Foetal Alcohol Disorder Service (FASD)

My final placement on clinical training was a split placement between the Complex Autism Service and Foetal Alcohol Disorder Service. The Complex Autism Service provides extended formulation and psychoeducational work for adults with a diagnosis of Autism. At the service I worked closely to create individual complex formulations for three autistic individuals. As a relatively new service I also worked closely in the design of both the new psychoeducational group for Autism and treatment pathway for clients. I have provided supervision for an assistant psychologist conducting neuropsychological assessments, group supervision for clinicians in other services working with individuals with Autism and training for psychological wellbeing practitioners for working with neurodivergent individuals. My service also works closely with the Autism Assessment Service and as such I have completed the ADOS-2 training and contributed to adult Autism assessments. The foetal alcohol disorder service provides clinical, developmental and neuropsychological assessments for individuals aged 6+ who are suspected of having Foetal Alcohol Disorder. As part of this process, I have completed numerous clinical assessments establishing the current impact of symptoms on individuals; neuropsychological tests of cognitive (WAIS & WISC) functioning, executive functioning (BADS & BADS-C) and visuospatial functioning (REY); and extensive developmental history assessments to establish symptoms of autism and ADHD with carers. Upon completion of these assessments, I have liaised with team members and analysed medical records to establish the correct diagnosis. Finally, I have written numerous extensive reports to summarise the assessments, outcomes and suggested support for individuals with FASD and their families.

Part 4
Assessments Completed During Training

PSYCHD CLINICAL PROGAMME
TABLE OF ASSESSMENTS COMPLETED DURING TRAINING

Year I Assessments

ASSESSMENT	**TITLE**
WAIS	WAIS Interpretation and Administration
Practice Report of Clinical Activity	A report of clinical activity for a CBT based intervention for a female client in their mid-20's working with perfectionism.
Report of Clinical Activity N=1	CBT based intervention for a white British male in his late twenties diagnosed with OCD
Major Research Project Proposal	Validation of the diagnostic criteria of Internet Gaming Disorder in the DSM-V among the esports community
Service-Related Project	A clinical note audit of current treatment practices, in relation to NICE guidelines, for service users who present with symptoms of PTSD/trauma at a local community mental health team

Year II Assessments

ASSESSMENT	**TITLE**
Report of Clinical Activity/Report of Clinical Activity – Formal Assessment	Neurological assessment of a Pakistani British female in her early sixties reporting difficulties with memory and word recall.
Presentation of Clinical Activity	Presentation of Clinical Activity Belinda

Year III Assessments

ASSESSMENT	**TITLE**
Major Research Project Empirical Project	Validation of the diagnostic criteria of Internet Gaming Disorder in the DSM-V among the esports community
Major Research Project Literature Review	Autism Spectrum Disorders (ASD) and Internet Gaming Disorder (IGD): A scoping review.
Application of Systemic Ideas to a Clinical Scenario	Integrative systemic intervention for an adolescent male referred with 'depression'
Report of Clinical Activity/Report of Clinical Activity – Formal Assessment	Extended formulation for a white British autistic female in her early twenties