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Psychometric validation of the Turkish nine-item Internet Gaming Disorder Scale–Short Form (IGDS9-SF)

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ABSTRACT

The main aims of the current study were to test the factor structure, reliability and validity of the nine-item Internet Gaming Disorder Scale-Short Form (IGDS9-SF), a standardized measure to assess symptoms and prevalence of Internet Gaming Disorder (IGD). In the present study participants were assessed with the IGDS9-SF, nine-item Internet Gaming Disorder Scale (IGDS) and the Young's Internet Addiction Test-Short Form (YIAT-SF). Confirmatory factor analyzes demonstrated that the factor structure (i.e., the dimensional structure) of the IGDS9-SF was satisfactory. The scale was also reliable (i.e., internally consistent with a Cronbach's alpha of 0.89) and showed adequate convergent and criterion-related validity, as indicated by statistically significant positive correlations between average time daily spent playing games during last year, IGDS and YIAT-SF scores. By applying the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) threshold for diagnosing IGD (e.g., endorsing at least five criteria), it was found that the prevalence of disordered gamers ranged from 0.96% (whole sample) to 2.57% (e-sports players). These findings support the Turkish version of the IGDS9-SF as a valid and reliable tool for determining the extent of IGD-related problems among young adults and for the purposes of early IGD diagnosis in clinical settings and similar research.

1. Introduction

Over the last decade, many efforts have been made to conceptualize and assess pathological involvement with video games (Gentile et al., 2011; Pontes and Griffiths, 2014). Although the positive effects of healthy gaming have been widely demonstrated by previous research (Connolly et al., 2012), gaming can become pathological for some players when the activity becomes dysfunctional, harming an individual's social, occupational, family, school, and psychological functioning due emerging functional impairment caused by the activity (Gentile et al., 2011). In general, "gaming disorder" can be described as persistent, recurrent, and excessive involvement with computer or video games that cannot be controlled, despite associated problems (Griffiths, 2005; Lemmens et al., 2009). Moreover, since most previous studies on video game addiction have adapted the definition and the six criteria for "pathological gambling" from the fourth edition of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) (American Psychiatric Association [APA], 2000), the term "pathological gaming" has been adopted extensively to this type of behavior (Chiou and Wan, 2007; Gentile, 2009; Johansson and Gotestam, 2004; Keepers, 1990; King et al., 2013; Lemmens et al., 2011a, b, 2015). These six criteria *(preoccupation, tolerance, withdrawal, persistence, escape,* and *problems)* can also be found among the proposed criteria for Internet Gaming Disorder (IGD) in the latest (fifth) edition of the DSM (DSM-5) (APA, 2013; Petry and O'Brien, 2013). In addition to these six criteria, the DSM-5 included three other criteria defyning video game addiction: *deception* (Demetrovics et al., 2012; Gentile et al., 2011), *displacement* (Huang et al., 2007; Rehbein et al., 2010) and *conflict* (Lemmens et al., 2009). According to the DSM-5, IGD is clinically characterized by a "persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress" (APA, 2013), whereas prevalence rates of IGD has been found to range from 0.6–5.4% around the world (Király et al., 2015; Rehbein et al., 2015).

The APA included IGD in the Section III of the DSM-5 as a condition

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that needs further research before being fully recognized and accepted as an independent disorder in subsequent revisions of the DSM (APA, 2013; Petry and O'Brien, 2013). Although IGD includes the term "Internet", the DSM-5 states that IGD most often involves excessive engagement with specific Internet games, but it could also include engagement with non-Internet computerized games as well (APA, 2013). The nine IGD criteria resemble those of Gambling Disorder and substance use disorder (Petry et al., 2014). More specifically, the nine IGD criteria refer to preoccupation with Internet games, withdrawal symptoms, tolerance, unsuccessful attempts to control participation in Internet games, loss of interest in previous hobbies, continued excessive use of Internet games, deceiving family members, use Internet games to escape, and losing a significant relationship, job or education, or career opportunity. To be diagnosed as a disordered gamer, the APA states that at least five out of these nine criteria need to be endorsed by the gamer over a period of 12 months (APA, 2013).

Although IGD is not yet recognized as an official clinical entity by the APA (Petry and O'Brien, 2013), several new promising psychometric tools covering the nine IGD criteria have been developed following the initial inclusion of this condition by the APA in the DSM-5 (APA, 2013; Demetrovics et al., 2012; Huang et al., 2007; Király et al., 2017; Lemmens et al., 2015; Petry and O'Brien, 2013; Petry et al., 2014; Pontes et al., 2014; Pontes and Griffiths, 2015; Rehbein et al., 2010). A recent mini-review on the psychometric assessment of IGD identified several instruments assessing IGD according to the diagnostic criteria developed by the APA in the DSM-5 (APA, 2013; Pontes, 2016); the Internet Gaming Disorder Scale (IGDS; Lemmens et al., 2015), the Internet Gaming Disorder Test (Pontes et al., 2014), the nine-item Internet Gaming Disorder Scale–Short-Form (IGDS9-SF; Pontes and Griffiths, 2015), the 10-item Internet Gaming Disorder Test (Király et al., 2017), the updated Clinical Video game Addiction Test (van Rooij et al., 2017) and the Video Game Dependency Scale (Rehbein et al., 2015). Although a relatively high number of standardized assessment tools to assess IGD have been recently developed, the IGDS9-SF, which was developed to be utilized in large-scale surveys, has been extensively utilized in several countries and employed in a number of research studies given its excellent psychometric properties and conciseness to assess IGD in time-limited research. More specifically, the IGDS9-SF has been developed and adapted to different languages, such as: English (Pontes and Griffiths, 2015; Pontes et al., 2017), Slovenian (Pontes et al., 2016), Portuguese (Pontes and Griffiths, 2016), Italian (Monacis et al., 2016), and Persian (Wu et al., 2017). Although these international studies utilizing the IGDS9-SF have not directly estimated mean scores of IGD across different populations investigated due to their exclusive psychometric focus, these studies have provided key insights on the diagnosis and measurement of IGD. For example, these studies have collectively established that IGD is better conceptualized as a one-factor construct as opposed to a multidimensional construct, and that significant cultural differences may exist regarding the clinical importance of each of the nine IGD criteria across different populations (e.g., de Palo et al., 2018; Pontes et al., 2017; Stavropoulos et al., 2018). Furthermore, a recent study investigating the invariance of the IGD construct in a sample of Australian, North American, and British gamers found significant cross-country variations in the strength of the relationships between the IGD indicators and their respective factor as the IGDS9-SF items 1, 2 and 5 presented non-invariant loadings across the three populations investigated (Stavropoulos et al., 2018).

The IGDS9-SF has been used to assess symptoms and prevalence of IGD in both adolescent and adult samples and has a number of advantages over other existing similar tools. First, it was directly developed using the nine criteria of IGD defined by DSM-5, thus making the scores obtained by participants assessed with this tool useful to clinicians when diagnosing disordered gaming (Wu et al., 2017). Second, the IGDS-SF9 is quick to administer because it contains only nine items, potentially helping clinicians in busy clinical settings. Although most of the previous IGDS9-SF validation studies were carried out among Western populations (e.g., Pontes and Griffiths, 2015; Pontes et al., 2016; Pontes and Griffiths, 2016; Monacis et al., 2016), one study has been recently conducted to develop the Persian version of the IGDS9-SF (Wu et al., 2017). Petry et al. (2014) suggested that "establishing the psychometric properties of instruments assessing these nine [IGD] criteria should begin using a cross-cultural perspective", and because gaming behavior may differ across cultures, studies examining the psychometric properties of the IGDS9-SF in distinct countries around the world are needed (Pontes et al., 2017). This notion is partly supported by a recent study on the IGDS9-SF that investigated the cross-cultural feasibility of the scale across gamers from the United States of America (USA), India, and the United Kingdom (UK) (Pontes et al., 2017). Although the one-factor structure of the IGD construct was supported, cross-country variations were demonstrated and reflected on IGD items assessing preoccupation/salience, tolerance, deception, gaming escapism/mood modification, as well as daily activities' impairment related to gaming. Furthermore, the same scores on items assessing withdrawal symptoms, tolerance, lack of control over gaming engagement, escapism/mood modification and daily activities impairment associated to gaming, have been found to reflect various levels of IGD severity across distinct groups (van Rooij et al., 2017), further highlighting the effects of cultural differences in the assessment of IGD.

At present, a brief Turkish IGD measurement tool is lacking for clinical and research purposes to facilitate the assessment of IGD according to the APA framework. Thus, the aim of the present study was been to develop a Turkish version of the IGDS9-SF and to evaluate its psychometric properties (i.e., internal consistency, unidimensionality, construct validity, convergent and criterion-related validity) among different gamers (e.g., professional and non-professional). The present study also aimed to provide reliable prevalence rates of IGD among Turkish young adults. By conducting the present study and achieving the proposed aims, this study will hopefully make a unique contribution to advancing the knowledge base on the cross-cultural implications in the assessment of IGD using the new framework developed by the APA within the DSM-5. Additionally, the findings reported here may be fruitful to clinicians in need of extended information concerning the diagnostic efficiency of the most commonly utilized IGD assessment tool.

2. Method

2.1. Participants and procedure

An online survey using a cross-sectional design was set up in order to develop and test the psychometric properties of the Turkish IGDS9-SF. Moreover, data were collected from Turkish university students in Ankara, people who were in the e-mail database of a company located in Istanbul that organizes e-sports tournaments (ESL Turkey Amateur e-sport players), and from Turkish gamers on gaming forums.

The study protocol was approval by the Ethical Committee of the Cankaya University (Turkey) and the study was anonymous and confidential. After reading the Plain Language Information Statement, an online anonymous and confidential survey was created using Qualtrics. Furthermore, participants were informed that they would not be penalized for not wanting to participate and/or abandoning the study once they have started it. Participants sampled from Cankaya University that agreed to participate in the study were rewarded with credits for particular courses they were enrolled at the time of the study. Overall, the data collection stage spanned from December 2017 to January 2018.

A total of 1,507 potential participants initiated the online survey. Among these, data from 257 participants were systematically missing as they did not fully complete the survey, which resulted in exclusion from the study.

Thus, a total of 1,250 participants were included in the study. The

Table 1
Sociodemographic characteristics of the sample.

	n	%
Gender (male, n, %)	548	43.8
Age, years; Mean (SD) Minimum–Maximum	21.84 (3.42)	15–48
Type of participant (n, %)		
Professional e-athlete*	15	1.2
Amateur e-athlete**	33	2.6
Plays games for his/her own pleasure and/or follow e-sports	263	21.0
University student and frequently play games on the Internet	337	27.0
University student and seldomly play games on the Internet	602	48.2
Time daily spend on the gaming[a], hours (n, %)		
Less than 1 h	716	57.3
More than 1 h, less than 3 h	285	22.8
More than 3 h, less than 6 h	148	11.8
More than 6 h, less than 9 h	55	4.4
More than 9 h	46	3.7

* Regularly receives monthly salary,
** Has a team and participates to the tournaments and makes money in the tournament,
[a] During last year.

mean age of the sample was 21.84 years (SD = 3.42 years). Among these, 548 were male (43.8%) and 702 were female (56.2%). Moreover, almost half of participants reported being university students that occasionally played games on the Internet (n = 602, 48.2%).

The main sociodemographic characteristics of the sample is shown on Table 1. Accordingly, IGDS9-SF scores were significantly higher among males (18.60 ± 7.43) than females (13.07 ± 5.29) ($t = -14.74$, $p < 0.001$). Moreover, males spent significantly more daily time gaming during the last year than females ($\chi^2 = 248.41$, $p < 0.001$). Similarly, those involved in e-sports, both as an amateur or professionally, had higher IGDS9-SF scores (19.18 ± 7.70) than university students (14.28 ± 6.13) ($t = -10.208$, $p < 0.001$). Finally, those involved in e-sports also spent significantly more daily time gaming during the last year than university students ($\chi^2 = 205.39$, $p < 0.001$).

2.2. Measures

2.2.1. Internet Gaming Disorder Scale–Short-Form (IGDS9-SF)

The IGDS9-SF assesses the symptoms and severity of IGD and its detrimental effects by examining both online and/or offline gaming activities occurring over a 12-month period (Pontes and Griffiths, 2015). The scale comprises nine items corresponding to the nine core criteria defined by the DSM-5. They are answered on a five-point Likert scale ranging from (1) *never* to (5) *very often* and high scores on the scale translate onto higher level of gaming disorder. In the present study, the IGDS9-SF was initially translated from English to Turkish by two Turkish psychiatrists that were fluent in English. These experts reached consensus on the translated version. Following this, the Turkish version of the IGDS9-SF was then translated back from Turkish to English by an independent translator to establish their comparability. The final translation was piloted on to 20 gamers to determine whether the language was clear and to ensure the scale's face validity. Among these 20 gamers (all students from the Cankaya University), 10 were male (50.0%) and 10 were female (50.0%), and the mean age of the sample was 22.05 years (SD = 3.40).

2.2.2. Internet Gaming Disorder Scale (IGDS)

The IGDS was used to further assess the validity of the IGDS9-SF. All participants received the polytomous IGDS and rated all items on a six-point scale: (0) *never,* to (5) *every day or almost every day* (Lemmens et al., 2015). The unconstrained model for nine-item IGDS yielded an acceptable model fit and the scale had excellent reliability (α = 0.95) (Lemmens et al., 2015). The Turkish version of the scale has been validated (Evren et al., 2017) and the nine-item IGDS was also found to have excellent levels of internal consistency in the present study (α = 0.93).

2.2.3. Young's Internet Addiction Test–Short Form (YIAT-SF)

Given that a high association has been previously found in the literature between the Internet addiction and IGD, some authors have argued that IGD represents "a part of the postulated construct of Internet addiction" (Monacis et al., 2016). Thus, in the present study the YIAT-SF (Pawlikowski et al., 2013) was used to further investigate the validity of the IGDS9-SF. The YIAT-SF assesses symptoms of Internet addiction and includes a total of 12 items measured on a five-point scale (1) *never* to (5) *very frequent*. Confirmatory Factor Analysis (CFA) revealed that the Turkish YIAT-SF resulted in an acceptable model fit ($\chi^2 = 173.58$, sd = 53, CFI = 0.95, SRMR = 0.064 and RMSEA = 0.079). The Turkish version of the YIAT-SF has been previously shown to be reliable and valid for both university students and adolescents (Kutlu et al., 2015). In the present study, the reliability of the YIAT-SF was fairly robust (α = 0.88).

2.3. Data analysis

To carry out the analyzes IBM SPSS Amos was used for CFA and IBM SPSS Statistics Version 20 for the remaining statistical analyzes. Prior to the analyzes, data cleaning was conducted by inspecting cases with severe missing values across the main instruments. The following strategies were adopted to assess the psychometric properties of the Turkish IGDS9-SF: (a) its factorial structure was firstly examined using Exploratory Factor Analysis (EFA) then CFA; (b) convergent and criterion-related validity were determined by estimating Pearson product moment correlation coefficients between the total scores of the IGDS9-SF, IGDS, YIAT-SF and the self-reported average daily time spent playing games during last year; (c) internal consistency was assessed using Cronbach's alpha.

3. Results

3.1. Factor structure

In order to investigate the factor structure (i.e., dimensionality) of the IGDS9-SF, an initial EFA followed by CFA was conducted using the data collected.

Prior to any further analysis, the adequacy of sample size was checked using Bartlett's Test of Sphericity and the Keiser–Meyer–Olkin (KMO) measurement of sampling adequacy. The Bartlett's Test of Sphericity was significant ($\chi^2 = 5027.380$, $df = 36$, $p < 0.001$) for the IGDS9-SF, and the KMO measure of sampling adequacy was acceptable at 0.93. Principal Axis Factoring extraction method with Promax (oblique) rotation on the nine items of the IGDS9-SF was performed to preliminary examine its factorial structure and construct validity. The number of components to be extracted was determined through examination of scree pilot (Byrne, 2010) in combination with the conventional Kaiser criterion guideline (all factors with eigenvalues greater than one) (Hair et al., 2010). Furthermore, the acceptable threshold of items with factor loadings above 0.50 and/or parallel loadings below 0.20 was used to retain items (Cattell, 1966). Based on these procedures, the EFA resulted in a one-factor solution for the nine items of the IGDS9-SF by reaching the criterion of an Eigenvalue greater than one (4.418). Overall, the total variance accounted for by this component was 49.09% (Table 2).

The unidimensionality of the Turkish IGDS9-SF was then subsequently assessed via CFA with maximum likelihood. In order to evaluate the quality of the model estimated in the CFA, several fit indices were used and the following thresholds adopted: $\chi 2/df \leq 5$, Goodness

Table 2
Summary of the results from the EFA on the Internet Gaming Disorder Scale- Short Form (IGDS9-SF) nine items obtained from the whole sample.

Item[a]	Factor loadings Factor 1[c]	Communalities Initial	Extraction	Corrected item-total correlation	Cronbach's Alpha if item deleted
1. Preoccupation/salience	0.647	0.408	0.418	0.612	0.886
2. Withdrawal symptoms	0.704	0.454	0.495	0.661	0.882
3. Tolerance	0.743	0.513	0.553	0.702	0.878
4. Loss of control	0.733	0.502	0.538	0.685	0.880
5. Giving up other activities	0.733	0.492	0.538	0.688	0.879
6. Problems	0.757	0.525	0.573	0.707	0.878
7. Deception	0.662	0.434	0.439	0.621	0.885
8. Escapism/mood modification	0.658	0.399	0.434	0.623	0.886
9. Negative consequences	0.657	0.424	0.431	0.617	0.885
Eigenvalue	4.921				
Variance %[b]	54.68				
Mean ± SD	15.50 ± 6.89				

[a] Full description of items were omitted from the table for the shake of clarity.
[b] Persentage of the total variance explained.
[c] Only one factor was possible to be extracted from the EFA after four iteration.

Table 3
Summary of CFA results of factor loadings, Cronbach's alpha and inter-item correlations obtained from the nine items of the IGDS9-SF.

Item	Factor Loadings	R Square	Inter-item correlations 2	3	4	5	6	7	8	9
1. Preoccupation/salience	0.666	0.44	0.479	0.569	0.463	0.454	0.457	0.376	0.475	0.374
2. Withdrawal symptoms	0.716	0.51		0.541	0.572	0.498	0.512	0.450	0.440	0.440
3. Tolerance	0.760	0.58			0.559	0.522	0.519	0.455	0.525	0.445
4. Loss of control	0.749	0.56				0.585	0.544	0.450	0.458	0.438
5. Giving up other activities	0.726	0.53					0.584	0.575	0.587	0.568
6. Problems	0.708	0.50						0.565	0.470	0.543
7. Deception	0.612	0.37							0.411	0.449
8. Escapism/mood modification	0.663	0.44								0.450
9. Negative consequences	0.609	0.37								–
Cronbach's alpha	0.894									

All factor loadings and item-item Pearson correlations were statistically significant ($p < 0.001$)

of Fit Index (GFI), Tucker-Lewis Fit Index (TLI) and Comparative Fit Index (CFI) > 0.90, and Root Mean Square Error of Approximation (RMSEA) < 0.05 (Ferguson and Cox, 1993; Kaiser, 1960; Lin et al., 2013; Wu et al., 2015). The estimation of a unidimensional model produced an adequate fit (χ^2/df = 99.5/23 = 4.32; GFI = 0.982, CFI = 0.985, TLI = 0.976 and RMSEA = 0.052). As seen in Table 2 and 3, all item-component loadings were statistically significant and within the conventional acceptable threshold of > 0.50. Thus, results from the EFA and the CFA suggest that the Turkish IGDS9-SF assesses a unidimensional construct.

3.2. Convergent and criterion-related validity

Convergent validity was assessed by correlating the IGDS9-SF scores with the scores of two related scales (i.e., the IGDS and YIAT-SF) and criterion-related validity was evaluated through examination of the correlation between the IGDS9-SF scores and self-reported average daily time spent gaming during the last year. The correlation between the IGDS9-SF and the YIAT-SF ($r = 0.457$, $p < 0.001$) and the IGDS ($r = 0.769$, $p < 0.001$) was robust and statistically significant. Moreover, this result was also consistent with the association between the IGDS9-SF scores and self-reported average daily time spent on gaming during the last year ($r = 0.550$, $p < 0.001$). Overall, these results demonstrate statistically significant positive correlations among the variables of interest in the expected direction according to the underlying theory, thus further supporting the validity of the Turkish IGDS9-SF.

3.3. Internal consistency

In terms of reliability of the Turkish IGDS9-SF, the Cronbach's alpha coefficient was high ($\alpha = 0.89$) (Table 3). Moreover, the Cronbach's alpha coefficient did not increase by deleting any of the nine items of the scale. Furthermore, the item-total correlation for the IGDS9-SF was equally robust, ranging between 0.61 (item 1) and 0.70 (item 6) (Table 2). Finally, the inter-item correlation pattern for the IGDS9-SF ranged between 0.37 (between item 1 and 9) and 0.58 (between item 5 and 8) (Table 3).

3.4. Prevalence rates of IGD

As per the diagnosis recommendation made by the APA, participants endorsing at least five out of the nine IGD criteria in this study were operationally defined as potentially meeting a positive IGD diagnosis (APA, 2013; Petry and O'Brien, 2013). Based on the approach utilized by previous research using the IGDS9-SF (e.g., de Palo et al., 2018; Gomez et al., 2018; Pontes, 2017; Stavropoulos et al., 2018), participants' answers to the IGDS9-SF items as (5) *"very often"* were operationalized as endorsement of a criterion. Thus, the prevalence of potential IGD was about 0.96% ($n = 12$) for the whole sample and around 2.57% ($n = 8$) among e-sports gamers. While about 2.4% ($n = 8$) of those involved in e-sports had potential IGD, only 0.4% ($n = 4$) university students had a positive diagnosis.

4. Discussion

The main aim of the current study was to develop and examine the psychometric properties of the Turkish IGDS9-SF. To achieve this aim,

the newly developed psychometric tool was tested in a cross-sectional study using an online survey to recruit Turkish university students and online gamers playing video games both as an amateur or professional e-sports gamer. Overall, the findings of the present study support the validity of the IGDS9-SF across several levels. A single-factor solution for the IGDS9-SF was found across both EFA and CFA, further supporting the unidimensional factor structure of the IGDS9-SF reported in previous studies (de Palo et al., 2018; Gomez et al., 2018; Stavropoulos et al., 2018). The results of the EFA and CFA yielded statistically significant and relatively high factor loadings, further demonstrating that all items were adequate indicators of the IGD construct and that the scale had adequate psychometric properties, alongside a solid factor structure. In the original study, the IGDS9-SF showed adequate reliability (α of 0.87), whereas Cronbach's alphas ranged between 0.87 and 0.96 in subsequent studies (Monacis et al., 2016; Pontes and Griffiths, 2016; Pontes et al., 2016, 2017; Wu et al., 2017). Consistent with these reliability findings previously reported, the Turkish version obtained similar for the newly developed IGDS9-SF (α = 0.89). In addition to this result, criterion-related and convergent validity were supported by the expected positive pattern of correlations that have emerged between the IGDS9-SF and all the related measures. The convergent validity of the scale was supported by the statistically significant correlations of the IGDS9-SF with the nine-item IGDS and the YIAT-SF, whereas the criterion-related validity of the scale was supported by the statistically significant correlation pattern with the variable average daily time spent gaming during the last year. In general, higher mean scores on the scale indicated greater average daily time spent on games and higher severities of IGD and Internet addiction. The IGDS9-SF provided a valid and reliable measure of IGD with excellent diagnostic accuracy that can be used in research and for diagnostic purposes among young adult male and female gamers. Overall, the results obtained in the present study corroborated prior validity studies on the IGDS9-SF (Monacis et al., 2016; Pontes and Griffiths, 2015; 2016; Pontes et al., 2016; Wu et al., 2017).

The prevalence rates of IGD ranged between 0.6% to 5.4% around the world according to previous research (Király et al., 2015; Rehbein et al., 2015). In the present study, prevalence of those potentially meeting a positive IGD diagnosis among the whole sample was 0.96% (n = 12). When only those who are involved in e-sports (n = 311) were considered, 2.57% (n = 8) of the sample was classed as potentially presenting with IGD, which was consistent with a recent Slovenian epidemiological study on IGD using the IGDS9-SF which found these rates to be around 2.5% in the whole sample and 3.1% among the gamers (Pontes et al., 2016). In a similar vein, those involved in e-sports, both as amateur or professional gamers, exhibited more severe IGD symptoms and spent greater average daily time on gaming during the last year in comparison to the subsample of university students.

Finally, in line with the data reported by previous research (Monacis et al., 2016), males appeared to be more engaged in gaming activities in comparison to their females as they presented more severe IGD symptoms and spent greater average daily time on gaming during the last year.

The present study is not without its limitations. Several potential shortcomings within the present study should be considered. First, the use of an online survey excludes people who do not have access to the Internet. Therefore, these findings may not be extended to participants who mostly play offline games due to lack of Internet access. Second, because all participants were self-selected, generalization of the present findings to the general population cannot be directly made. Third, the study may also be limited by the fact that all the data were collected using self-report questionnaires, which is a method subject to well known biases, such as social desirability biases, short-term recall biases, etc. Fourth, no history was recorded as to when the participants started to play online games, which is an important variable related with the presence and severity of IGD. Fifth, there was no diagnosis of IGD for each participant using a gold standard. Therefore, this study was unable to estimate sensitivity and specificity of the IGDS9-SF in detecting IGD. Nevertheless, the present study paves the way to future studies aiming at replicating these findings among individuals clinically diagnosed with IGD as data on clinical samples are currently sparse.

Despite these potential limitations, the results of the validity and reliability testing of the Turkish IGDS9-SF were found to be similar to the findings reported by previous studies. The present findings support the Turkish version of the IGDS9-SF as being a valid and reliable screening tool for assessing the symptoms and prevalence of IGD among young adults and e-esports gamers. These findings support the use of the IGDS9-SF for the purposes of early diagnosis and in other relevant research examining excessive and addictive video game play. The present study will hopefully foster research into gaming addiction in the Turkish-speaking populations, thus expanding the investigation into culture-specific factors and, at the same time, facilitating a general and international consensus for defining video game addiction using the IGD framework. Finally, future studies could benefit from replicating the findings of this study in a larger nationally representative sample to advance robust estimates of prevalence rates of IGD. However, this should only be done after extensive support for the suggested cutoff point of the IGDS9-SF has been provided (Pontes and Griffiths, 2016).

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