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Development of Internet Addiction Scale Based on DSM-5 Diagnostic Criteria: An Evaluation in Terms of Internet Gaming Disorder

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SUMMARY

Objective: Internet addiction (IA) turn out to be a serious health problem in our country as in the whole world, especially for young adults. To our knowledge, there are very few studies investigating IA and associated psychological variables in a Turkish sample. The purpose of this study is to develop the internet addiction scale (IAS) on the basis of the diagnostic criteria for internet gaming disorder, in the third section of the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) by the American Psychiatric Association (APA).

Method: The study included 331 university students consisting of 189 (57.1%) females and 142 (42.9%) males with a mean age of 21.6 (SD=2.61) years. Data were acquired with a Demographic Information Form, the Internet Addiction Scale (IAS), the UCLA Loneliness Scale (UCLA-LS), the Impulsive Behaviour Scale (IBS) based on the Minnesota Multiphasic Personality Inventory (MMPI), the Self-Compassion Scale (SCS) and the Basic Psychological Needs Scale (BPNS).

Results: Exploratory factor analysis revealed that the IAS has a 7-factor structure with an internal consistency coefficient of 0.97 in accordance with the DSM-5 diagnostic criteria.

Conclusion: Results of the statistical analyses showed the psychometric properties of IAS to be valid on a Turkish student sample and it significantly correlated with loneliness, self-compassion, impulsivity and basic psychological needs.

Keywords: Internet addiction, validity, reliability, impulsivity, psychological need

INTRODUCTION

The internet, which has a great power in the process of information technology, creates an in-depth impact on human life for better or worse. Approximately twenty years ago, the internet was at least as effective as the telephone or television, and some argues that it may harm the psychological well-being of individuals and society (e.g. Kraut et al. 1998). Over the past decade, people have access to exciting online-based contents such as gaming, gambling, shopping and pornography through mobile phones and other electronic devices. However, the use of the Internet is becoming increasingly problematic as those who are over-dependent or overuse the internet cannot control their online activities (Wu et al. 2016).

With the significant increase in internet usage among the youth, real relationships have turned into virtual ones. Therefore, further research in the field of psychology is needed to explore the effect of the internet. Accordingly, Goldberg (1996) proposed diagnostic criteria for Internet Addiction Disorder, which was based on the diagnostic criteria for substance use disorder in DSM-IV (American Psychiatric Association 1994), by focusing on tolerance, withdrawal or

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decrease in participation in important social and professional activities. In DSM-5 (American Psychiatric Association 2013), this disorder is listed as "internet gaming disorder" and it is added to the third part of DSM-5 for further research. Despite the research on the excessive use of the Internet, there are no identified consistent diagnostic criteria. The lack of these diagnostic criteria has led to inconsistent reporting of the frequency, process or progression and treatment of IA. In DSM-5, nine diagnostic criteria are recommended for internet game addiction. These are, obsessions with internet games (preoccupation with gaming), the withdrawal symptoms when internet games are not played (withdrawal), the need to spend more time gaming to satisfy the urge (tolerance), unsuccessful attempts to stop playing internet games (unsuccessful attempts), loss of interest in other life activities (loss), continuing to game despite the problems (continued excessive internet use), deceiving family members or others about the amount of time spent on gaming (deceive), the use of gaming to relieve negative moods, such as guilt or hopelessness (escape), having jeopardized or lost a job or relationship due to gaming (jeopardize). It is stated that tolerance and withdrawal are the most important dimensions of these diagnostic criteria, and if five of these nine diagnostic criteria are seen in a year, one can be diagnosed with internet gaming disorder (APA 2013).

Internet is a very common leisure time activity. It can be a way of coping with emotional or social difficulties. In terms of disrupting the functionality of the individual, the use of excessive internet seems to be associated with low academic outcomes, professional failure or negativity in family relationships (Cho et al. 2014, Ko et al. 2005). On the other hand, psychological dependence in IA seems to be related to loneliness, restlessness, depression, low physical activity, problems with developmental tasks, desire for continuous internet access and sleep problems (Yen et al. 2011).

Loneliness is an indicator of how our time is spent. It defines the situation in which an individual lives alone or without communicating with others. It is argued that avoiding socialization for internet users leads to negative psychological consequences such as loneliness (Kraut et al. 1998). The research of Waterloo et al. (2017) shows how emotion expressions are more easily expressed and differentiated through social media. Thatcher and Goolam (2005) state that one of the reasons of the need for socialization is the desire to get rid of loneliness and there is a significant relationship between problematic use of internet and social isolation. Similarly, other studies have shown that there is a significant and positive relationship between loneliness and internet use (Caplan 2002, Batıgün and Hasta 2010, Günüç 2009, Karapetsas et al. 2015).

The concept of self-compassion is closely related to the attitudes and approaches towards the self (Bennett-Goleman and Brown 2001, Salzberg 1997). When individuals with high levels of self-compassion experience failure, inadequacy or misfortune, they see dysfunctional actions and behaviours as normal human breakdown, rather than condemning or judging themselves, and they do not criticize themselves or others harshly. Laconi et al. (2017) found a significant relationship between the psychological variable of self-esteem, known to be closely and positively related to self-compassion (Neff and Vonk 2009) and psychopathological variables such as depression and problematic internet use. Also, significant relationships have been demonstrated between IA and the variables of defence mechanisms, coping strategies and personality traits.

Impulsiveness, lack of planning or thinking of the outcome includes impatience and the excitement of searching for new experiences. Impulsivity is often associated with dependent behaviours. In addition, IA is known to be associated with low impulse control (Hyera Ryu et al. 2018). Lee et al. (2012) reported that IA can be conceptualized as an impulse control disorder and impulsivity may be an indicator of vulnerability to IA.

Excessive internet use plays an important role as an unhealthy coping method to meet the basic psychological needs. There is a significant difference in the psychological needs of adolescents with high and low levels of IA. Adolescents with low levels of IA have higher autonomy, competence and relationship needs than adolescents with high levels of IA (Canoğulları 2014, Canoğulları and Güçray 2017).

The research on online addictions have increased in recent years. The internet games do not involve any intoxicating substance consumption or include problematic behaviors such as shopping, exercise, sex or video games. Still, it is regarded as an addiction. Therefore, there is a need for research on other areas of internet use (Kuss et al. 2014). Although DSM-5 claims that internet gaming addiction and IA disorder are the same and further studies are essential to explore these addictions (e.g. Cho et al. 2014, Griffiths and Pontes 2014). Research has shown that internet gaming addiction has a different appearance than other online activities (Montag et al. 2014). IGD may not be the same as IA. Griffiths and Pontes state that there is a need for conceptual clarity regarding the research about internet game disorder and they claim that DSM-5 can be misleading in terms of internet play disorder (Griffiths and Pontes 2014). Furthermore, research on other online activities and the positive or negative consequences of these activities do not seem to be sufficiently proven (Petry and O'Brien 2013). In this respect, it is important to measure IA with a standard tool. To address this research problem,

this study aims to develop an IAS through items obtained by reviewing the IA scales used Turkey and drawing on the scale developed by Cho et al. (2014) according to DSM-5 diagnostic criteria. This research also examines IA in terms of demographic variables such as age, gender, maternal education level and internet usage time and the relationships between IA and loneliness, self-compassion, impulsivity, basic psychological needs.

METHOD

Participants

The sample of the study consists of university students attending two different universities in Ankara. Convenient sampling was used to recruit the participants who are studying in the respective departments of engineering and psychology, philosophy and sociology. The 331 participants of the study, consisting of 189 (57.1%) female and 142 (42.9%) male students with a mean age of 21.6 (SD= 2.61, 17 – 20) years, were recruited by the convenience sampling method, at two different universities in Ankara mainly from the departments of engineering (n=119, 35.9%), psychology (n=126, 46.7%), sociology (n=26, 7.9%), philosophy (n=29, 8.7%). 30 participants did not answer this question. The maternal education level of the participants varied as illiterate (n=4, 1.2%), primary school (n=136, 41.1%), middle school and lycée (n=118, 35.6%) and university (n=67, 20.2%); and 4 (1.2%) participants did not answer the question of mother education level. Daily internet use by the participants varied as 0-2 hours (n=103, 31.1%), 3-5 hours (n=147, 44.4%) and ≥6 hours (n=64, 19.3%). Individuals with psychiatric diagnoses or using psychiatric drugs were not included in the study.

Measurement Tools

Demographic Information Form: This form includes information with regard to participants' gender, age, their mothers' educational qualification.

Internet Addiction Scale (IAS): The internet addiction scale of Cho et al. (2014) was translated into Turkish. The scale has 41 items. Later on, the internet addiction scales in Turkey were reviewed (Bayraktar 2001, Demirci ve ark. 2014, Günüç ve Kayri 2010) and a pool with 127 items were formed. After receiving three expert opinions, a scale with 66 items was devised.

UCLA- Loneliness Scale: To identify the level of loneliness perceived by the individual, a four-point Likert style scale consisting of 20 items was developed by Russel et al. (1980). In Turkey, the reliability and validity study was conducted by Demir (1989) and Cronbach's alpha internal consistency coefficient was calculated 0.96 and test-retest reliability was 0.94. The loneliness feeling increases as the total score obtained from the scale increases and the loneliness decreases as the total score decreases. In the current study sample, Cronbach's alpha internal consistency coefficient is 0.82.

Self-Compassion Scale- Short Form: The short form (Raes et al. 2011) of the original form (Neff 2003) was used in this research. The short form has a five-point Likert type 12 items and shows high correlation and reliability. The scale has 6 sub-scales: self-kindness, self-judgement, common humanity, isolation, mindfulness and over-identified. To compute a total self-compassion score, the following items are reverse scored: 1, 3, 7, 9, 11, 12. If the total score is high, then the feeling of self-compassion is also high. Cronbach's alpha internal consistency coefficient was found to be 0.96 and test-retest reliability was 0.94. The short form of the scale was used by selecting the items from the long form devised by Deniz et al. (2008). In the present study sample of the short form, Cronbach's alpha internal consistency coefficient is 0.78.

Impulsive Behavior Scale (The Minnesota Multiphasic Personality Inventory (MMPI): It was derived from MMPI as a result of research conducted by Gough in 1957. The scale was adapted into Turkish by Batıgün and Şahin (2003) to assess impulsive behaviors. Cronbach's alpha internal consistency coefficient of the scale is 0.73. The scale consists of 21 items and the scores are categorical (true and false) and between 0 and 1, which indicates the frequency of impulsive behavior (Dahlstrom et al. 1979). When the total score is calculated, the 8th and 11th items are reverse coded. In the present study sample, Cronbach's alpha internal consistency coefficient of the scale is 0.75.

Basic Psychological Needs Scale: The scale was developed by Deci and Ryan (2000). The adaptation, validity and reliability study of the scale was conducted by Kesici et al. (2003). It has three subscales; autonomy, competence and relatedness and 21 five-point Likert items. The total score obtained from the psychological needs scale shows the degree of desire of the individual for psychological needs. It is interpreted that individuals feel psychological need more as the total score they get from the scale decreases. Cronbach's alpha internal consistency coefficient of the scale was calculated 0.76 for the whole scale (Kesici et al. 2003). In the present study, the internal consistency coefficient of Cronbach's alpha is 0.88.

Procedure

Ethical permission was taken from the relevant university's community. The 41-item scale (Cho et al. 2014), which was developed on the basis of DSM-5 diagnostic criteria, was

translated into Turkish and was approved by three different reviewers. Then, more items were added to this scale upon reviewing other scales in Turkey, and a pool of items with 127 questions/statements was formed. The scale was reduced to 66 items when similar items were removed.

It took around 20 minutes for students to complete the forms. The forms that were incomplete or incorrectly filled were not taken into consideration. Prior to the analysis, the data set was reviewed and the data in the end group that were not within the normal distribution were removed from the data set.

RESULTS

Structure Validity Results
Exploratory Factor Analysis

Exploratory factor analysis was conducted to measure the construct validity of the IAS. As a result of the principal components and item analysis conducted without specifying any number of factors, 31 items whose discrimination levels were not acceptable, correlations were low, factor load values were below 0.30 or that are loaded on more than one item were discarded from the scale form. The analyses were conducted with 35 items. Kaiser-Meyer-Olkin (KMO) was calculated 0.96, which shows that the data were suitable for factor analysis. The exploratory factor analysis resulted in 7 factors with eigenvalues above 1 and explaining 67.12% of the total variance. The analysis of the principal components without specifying the number of factors showed a seven-factor structure. In addition to the analysis of the eigenvalues, the explained variance ratio, and the scree-plot of the eigenvalues, it was decided that seven factors were suitable for the scale.

As shown in Table 1, the first factor explained 12.47% of the variance, the second 11.37%, the third 10.27%, the fourth 10.22%, the fifth 9.97%, the sixth 6.42%, the seventh 6.40% and all factors explained 67.12% of total variance. The subscales are escape (5 items), unsuccessful attempts (6 items), withdrawal (7 items), preoccupation and tolerance (6 items), jeopardize (5 items), deceive (4 items) and health related side effects (2 items).

Reliability Analysis Findings

Cronbach's alpha internal consistency coefficients were calculated in order to determine the reliability of the IAS. The internal consistency coefficients of the scale were 0.89 for the first sub-scale (escape); 0.91 for the second sub-scale (unsuccessful attempts); 0.89 for the third sub-scale (withdrawal); 0.90 for the fourth sub-scale (preoccupation and tolerance); 0.84 for the fifth sub-scale (jeopardize); 0.77 for the sixth sub-scale (deceive); and 0.69 for the seventh sub-scale health related side effects. Finally, the total internal consistency coefficient of the scale was calculated to be 0.97.

The correlation coefficients between the IAS subscales ranged between 0.44 and 0.80 ($p<0.01$), and the highest relationship was between the withdrawal and the mental preoccupation-tolerance subscales (see Table 2).

Table 1. Results of the Factor Analysis and Reliability Analysis on the Internet Addiction Scale

	Items	1	2	3	4	5	6	7	Com
Avoiding negative emotions (Escape)	17. I forget my problems while I'm online.	.70							.71
	23. I go online to dissipate my thoughts about my life.	.70							.68
	35. I feel relieved to use the internet when I feel anxious or distressed.	.73							.72
	44. I go on the Internet to forget things that depressed me and annoyed me.	.74							.75
	60. I'd rather go online than do other things to relieve my stress.	.62							.72
Unsuccessful attempts to control Internet gaming use (Unsuccessful attempts)	31. I can't control the length of hours I use the Internet.		.50						.67
	48. I find myself saying "just a few more minutes" on the Internet.		.64						.68
	49. Even if I am aware of the negative effects of the Internet on my daily activities, I cannot help myself.		.68						.77
	53. Most of the time I find myself on the Internet longer than I intended.		.71						.69
	61. Even if I tell myself I have to stop, I stay on the Internet.		.59						.74
	63. I fail to fulfill my plans to limit my time on the Internet.		.61						.73

Continuation of Table 1

	Items	1	2	3	4	5	6	7	Com
Withdrawal symptoms when internet is taken away (Withdrawal)	13. I feel anxious and tense when I'm not on the Internet.			.52					.65
	38. I can't focus on other things because I wonder what happens when I'm not online.			.59					.63
	41. I feel sad and frustrated when I can't be on the internet, but these feelings disappear when I go on the internet.			.58					.72
	46. I feel bored and sad when I can't be on the internet.			.61					.74
	55. I can't stand the lack of internet connection.			.62					.68
	58. Without my Internet connection, my life is empty.			.54					.68
Preoccupation with internet gaming and tolerance (Preoccupation and tolerance)	7. Immediately after leaving the internet I feel the need to use the internet again.				.69				.74
	9. Even when I'm not on the internet, the internet comes to mind very often.				.69				.75
	10. I want to constantly increase the time I'm online.				.53				.64
	11. When I finish my other work, I tend to go online.				.51				.61
	14. I need to be on the internet longer to make me feel more excited than before.				.44				.62
	19. When I'm not using the internet, I can't wait to get on the Internet.				.48				.72
	30. When I'm not on the Internet, I think of the internet or dream of accessing the internet.				.37				.72
Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of Internet gaming use (Jeopardize)	15. I'm missing my classes to stay on the Internet longer.					.72			.69
	24. My lecture notes and assignments at school / things I have to do at work are negatively affected by my stay on the Internet.					.57			.66
	26. I often cancel other plans to spend more time on the Internet.					.60			.70
	47. I prefer to spend time with friends on the internet to spend time with real-life friends or family members.					.49			.54
	66. I miss going out with people because I'm buried too much on the Internet.					.51			.66
Has deceived family members, therapists, or others regarding the amount of Internet gaming (Deceive)	3. I hide the time I am online.						.49		.50
	18. People around me complain about the time I spent on the internet.						.71		.70
	36. I have problems with my friends because I use the internet.						.44		.67
	54. I have problems with my family members because of my internet use.						.57		.67
Continued excessive Internet use despite knowledge of negative psychosocial problems (Health related side effects)	33. I think my health has deteriorated since I started surfing the web.							.59	.56
	62. I am experiencing dizziness or blurred vision due to excessive internet use.							.68	.71
	Eigenvalues	5.49	5.01	4.52	4.50	4.39	2.83	2.82	
	Described variance (%)	12.47	11.38	10.27	10.22	9.97	6.42	6.40	67.12
	Cronbach's alpha coefficient of internal consistency reliability	0.89	0 .91	0.89	0.90	0.84	0.77	0.69	0.97

Table 2. Correlations between Internet Addiction Scale Sub-dimensions

	A-C	B	D	E	G	H	I
(A-C) Preoccupation and tolerance	-	0.80**	0.74**	0.46**	0.69**	0.67**	0.67**
(B)Withdrawal		-	0.70**	0.54**	0.70**	0.64**	0.69**
(D)Unsuccessful attempts			-	0.58**	0.67**	0.65**	0.69**
(E)Health related side effects				-	0.44**	0.53**	0.59**
(G)Escape/Avoidance					-	0.55**	0.59**
(H)Deceive						-	0.72**
(I)Jeopardize							-

**p<0.01

Nine diagnostic criteria for Internet use disorder in the DSM-5
A Preoccupation with internet gaming
B Withdrawal symptoms when internet is taken away
C Tolerance: the need to spend increasing amounts of time engaged in Internet gaming
D Unsuccessful attempts to control Internet gaming use
E Continued excessive Internet use despite knowledge of negative psychosocial problems
F Loss of interests, previous hobbies, entertainment as result of, and with the exception of Internet gaming use
G Use of the Internet gaming to escape or relieve a dysphoric mood
H Has deceived family members, therapists, or others regarding the amount of Internet gaming
I Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of Internet gaming use

The Seven diagnostic criteria that emerged as a result of the study for
Cho et al. (2014)
B (Withdrawal)
C (Tolerance)
D (Unsuccessful attempts)
E (Continued excessive internet use)
G (Escape)
H (Deceive)
I (Jeopardize)

Findings Related to Criteria-Related Validity

To test the criterion-related validity of the IAS, correlation coefficients were calculated between the sub-scales and total scores of the scale and the variables of loneliness, self-compassion, impulsivity and basic psychological needs. The total score of the scale and the coefficients between the other scales ranged between -0.33 (p<0.01) and 0.24 (p<0.01). There was a significant positive correlation at 0.24 (p<0.01) between the IAS and total score of loneliness scale. There was a negative correlation between the total IAS and Self-compassion level score at -0.16 (p<0.01). Likewise, there was a significant negative correlation between total score of the scale and frequency of impulsive behaviors at -0.33 (p<0.01) and the level of feeling that basic psychological needs were met at -0.24 (p<0.01). The coefficients between IA subscales and other scale total scores ranged between -0.32 (p<0.001) and 0.26 (p<0.001) and significant relationships were found (see Table 3).

Table 3. Correlations between Internet Addiction Scale and Criterion Variables

	UCLA-Loneliness	Self-compassion	MMPI- Impulsive Behaviors	Meeting the Basic Psychological Needs
Escape	0.26**	-0.20**	-0.32**	-0.24**
Unsuccessful attempts	0.21**	-0.17**	-0.25**	-0.22**
Withdrawal	0.13*	-0.10	-0.29**	-0.18**
Preoccupation and tolerance	0.18**	-0.13*	-0.30**	-0.18**
Jeopardize	0.24**	-0.10	-0.25**	-0.26**
Deceive	0.17**	-0.10	-0.25**	-0.18**
Health related side effects	0.23**	-0.08	-0.24**	-0.19**
Internet Addiction Scale total score	0.24**	-0.16**	-0.33**	-0.24**

**p<0.01 *p<0.05

Findings on Demographic Variables

When the effect of age variable was controlled, covariance analysis (ANCOVA) was performed on the total scores of the participants using the pattern of 2 (gender) x 3 (mother's education) x 3 (internet usage time). The analysis showed the age variable was significant (F (1,302) =8,06, p <0.01, η^2=0.03). Significant differences were found in the main effects of gender (F (1,302) = 4.60, p<0.05, η^2=0.02) and internet usage hours (F (2,302) =21.87, p<0.001, η^2=0.13). According to Bonferroni Test, the Internet mean scores of males (M=77.41, SD=2.54) were higher than the mean scores of females (M=70.26, SD=2.16) and this difference was significant at p<0.05 level. In terms of internet usage time variable, the group using the internet between 0-2 hours (M=58.32, SD=3.05) has lower scores than those using the internet between 3 and 5 hours (M=76.17, SD=2.36) and for 6 hours and longer (M=87.02, SD=3.21). IA scores and these differences are significant at p<0.001 level. It was found that the group using internet for 3 to 5 hours had lower IA score than the group using internet for 6 hours and longer and this difference was found to be significant at p<0.05 level. In terms of interaction effects, only the interaction effect of "mother education x internet usage time" creates a significant difference (F (4,302) =2.68, p<0.05, η^2=0.03).

When the mother is a primary school graduate, the ones who use the internet for 0 to 2 hours (M=58.32, SD=3.05) have lower internet scores than those who use the internet for 3 to 5 hours (M=76.17, SD=2.36) and those who use the internet longer than 6 hours (M=87.02, SD=3.21) and these differences are significant at p<0.001 level. When the mother is a secondary school / high school graduate, those who use the internet for more than 6 hours have higher IA scores than those who use the internet for 0 to 2 hours and 3 to 5 hours and these differences are significant at p<0.01 level. When the mother is a university graduate, those who use the internet 0 to 2 hours get lower IA scores than those who use the internet for 3 to 5 hours and longer than 6 hours and these differences are significant at p<0.001 level.

DISCUSSION

The exploratory factor analysis showed that the factor structure of the IAS has 7 subscales and 35 items as opposed to nine factors as suggested in DSM-5. The scale developed in this research aligns with the research of Cho et al. (2014) and is supported by the relevant literature (Caplan 2002, Cho et al. 2014, Liu et al. 2013, Lortie and Matthieu 2013, Ran et al. 2010). In the study of Cho et al. (2014), the correlation between sub-scales of preoccupation with the internet and withdrawal was close to one. Similarly, there was a high correlation between other factors and sub-scale of interest loss of interest in other activities, and therefore preoccupation and loss were excluded from the model. Based on these results, Cho et al. (2014) concluded that nine-factor of DSM-5 model was not appropriate. In this respect, it is not appropriate to include every criterion suggested by DSM-5 among the IA factors, and it is advisable to collate some criteria under a single factor for DSM-5 in further studies (Cho et al. 2014). In support of this view, in the present study, the sub-scales of *preoccupation with internet* and *tolerance* were gathered under a single factor, and sub-scale of the *loss of interest in activities other than the internet* disappeared as a result of factor analysis. On the other hand, the sub-scales of *tolerance* and *withdrawal* were evaluated as important criteria among those proposed by DSM-5 diagnostic criteria for internet gaming disorder (APA 2013). The research of Petry et al. (2014) showed that *loss of interest in other activities, tolerance* and *withdrawal* are the most important criteria of internet gaming disorder, whereas *avoidance* and *mental preoccupation* were found to be the least correlated criteria in terms of differentiating internet game disorder. In this research, factor structure of IAS was based on 7 sub-scales, such as avoidance (5 items), unsuccessful attempts (6 items), withdrawal (7 items), preoccupation and tolerance (6 items), jeopardize (5 items), deceive, (4 items) and health related side effects (2 items).

This study shows that there is a significant relationship between the IA sub-scales and total scale, and the variables of loneliness, self-compassion, impulsiveness and basic psychological needs and indicates that IAS is reliable. In this context, the relationship between the IAS and the loneliness variable was examined and it was found that there were significant positive relationships. The research of Durualp and Çiçekoğlu (2013) with teenagers in the orphanage suggested that that loneliness scores of individuals with high levels of IA were found to be higher than those with low levels of IA. Similarly, Shettar et al. (2017) examined the relationship between Facebook addiction and loneliness and found that there was a positive and significant relationship between these two variables. In another study, Batıgün and Hasta (2010) stressed that the duration of internet use, the purpose of Internet usage, the restrictive style in interpersonal relationships and loneliness were among the important predictors of IA. Therefore, it can be concluded that excessive internet usage may isolate individuals and may urge individual with limited social skills to spend more time on the internet.

According to Esen and Siyez (2011) research conducted with adolescent, there is a negative relationship between life satisfaction, which shows subjective well-being, and IA. The

study of Iskender and Akın (2011) with university students examined the relationships between self-compassion and IA and found that there was a positive relationship between IA and self-judgment, isolation, excessive identification, which are negative sub-scales of self-compassion in terms of psychological health. They also noted negative relationships between self-caring, awareness of sharing and mindful awareness which are positive sub-scales of self-compassion in terms of psychological health. In parallel with this result, this study concluded that there is a significant negative relationship between self-compassion and IA as expected. Self-compassion, which is known to be an important predictor of psychological health, has a negative relationship with psychological symptoms (Andiç 2013, Bayramoğlu 2011). Therefore, it is expected that the level of IA will increase as individuals' self-compassion level decreases.

Adolescents with internet gaming disorder has higher dorsolateral prefrontal activation which is an indicator of impulsiveness (Lee et al. 2015). In this research where impulsivity was evaluated in terms of impatience, reduced planning, and excitement seeking dimensions, it was shown that there was a significant relationship between IA and impulsivity (Akın 2014). The findings of this study show that there is a significant relationship between impulsivity and IA, but it is noteworthy that this relationship is negative and not compatible with the literature. This is thought to be related to the measurement tool which measures impulsivity in terms of a single dimension. Further research can use alternative measurement tools that measure impulsivity in multidimensional dimensions.

It is known that the individual's psychological needs have an important role on online behaviors (Li et al. 2016), and there also studies focusing on the relationship between IA and psychological needs (e.g. Arpaci et al. 2018, Wong et al. 2014, Yu et al. 2015). These studies suggest that there is a negative meaningful relationship between basic psychological needs and IA. Psychological needs may cause IA and the use of the internet as a social tool can be effective in meeting these needs. As a result, in terms of criterion validity of IAS, the significant relationship between loneliness, self-compassion, impulsivity, and basic psychological needs variables was also echoed in the relevant literature, and it was concluded that the scale was a valid scale.

This study investigated the demographic variables of age, gender, education level of the mother and internet usage time. It can be foreseen that the effect of age variable cannot be ignored, and the risk of IA may decrease as the individual progresses from early adolescence to young adulthood. When the, mother education and internet usage time variables are taken into consideration, it can be said that male students are a riskier group in terms of IA than female students, and the probability of developing IA may increase as the time of internet usage increases. Ko et al. (2005) found that men had higher IGD than women, and this difference was significant. On the other hand, Balcı and Gülnar (2009) investigated IA on university students and concluded that demographic variables such as gender did not have a significant role. Contrary to the finding that IA scores differ according to gender (Cao and Su 2007, Esen and Siyez 2011), there are also studies showing that there is no difference between women and men in terms of prevalence of IA (Kim et al. 2006) or in terms of IA levels (Batıgün and Hasta 2010, Hall and Parsons 2001, Subrahmanyam and Lin 2007). On the other hand, level of mother education was taken as the indicator of socioeconomic level in this research and it was concluded that mother education did not have a fundamental effect on IA. Although this finding is consistent with the relevant literature (e.g. Esen and Siyez 2011, Jackson et al. 2003), it is expected that income and education level may be related to internet use, and it is thought that socioeconomic level difference may decrease with increasing use of internet. According to the interaction between the IA and maternal education level, duration of internet use may change and this is a consistent finding with the relevant literature (Batıgün and Hasta 2010). This indicates that the interaction between mothers' education level and internet usage time may be a risk factor for IA. In summary, focusing only on IA regardless of age, sex, education level of mothers and the use of internet, and variables such as loneliness, self-compassion, impulsivity and psychological needs or other psychiatric symptoms may prevent the success of the treatments.

One of the important limitations of the study is that the sample group consisted of only university students and there is no possibility of comparison with the clinical sample that can be diagnosed as IA. In addition, it is known that the Internet-related addiction in DSM-5 is limited to Internet Gaming Disorder with no distinction regarding the general use of the Internet. However, this limitation was not used in the present study and scale items were developed according to DSM-5 diagnostic criteria (see Cho et al. 2014). The lack of internet gaming disorder items may be another limitation. On the other hand, this research includes general expressions that use of the Internet cannot be limited to games, but also assesses different addictions such as shopping, social accounts, gambling, pornography and chat. The reason for this is that the internet and internet gaming addiction items are expected to be similar. Despite these limitations, a valid and reliable scale was developed based on the IA diagnostic criteria proposed in DSM-5. This study revealed important

findings that will contribute to the literature in Turkey regarding understanding of IA symptoms and establishing standard diagnostic criteria.

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