



RESEARCH ARTICLE

Internet Gaming Disorder: Life satisfaction, negative affect, basic psychological needs, and depression

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ABSTRACT

Objective: The purpose of this study was to propose a model to examine the relationships between Internet Gaming Disorder (IGD), depression, life satisfaction, basic psychological need satisfaction, and negative affect.

Method: A total of 339 university students participated in this study. Of the participants, 244 mentioned that they played digital games and 95 mentioned that they did not play any digital games. Of the 244 students who played digital games, 131 were females (53.7%) and 113 were males (46.3%). In the study, Personal Information Form, Internet Gaming Disorder-Short Form, Basic Psychological Need Satisfaction Scale, Negative Affect Scale, and the Satisfaction with Life Scale were used as data collection tools.

Results: As a result of the structural equation model, it was found that the relationship between basic psychological needs and IGD was mediated by life satisfaction. Besides, it was concluded that negative affect mediated the relationship between IGD and depression.

Conclusion: This study presented a new model to demonstrate that the satisfaction of basic psychological needs was essential for IGD because it affected life satisfaction, which could lead to depression and negative affect.

Keywords: Basic psychological needs, depression, IGD, life satisfaction, negative affect

INTRODUCTION

All over the world, computer games are becoming more popular every day, and they keep gamers by the screen for a long time. With the advances in computer technology and the widespread use of mobile applications and the internet, the number of users has gradually increased. In the United States, more than 164 million adults play video games, and three-quarters of all Americans have at least one gamer in their homes (1). Gamers spend a lot of time playing games (2). Although computer games are entertaining

(3), the concept of gaming addiction has emerged due to the long time spent in front of the screen (4). The American Psychological Association added Internet Gaming Disorder (IGD) to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) as a disorder that required further investigation (5). Accordingly, IGD has been considered a behavioral addiction that is not dependent on substances. It started to be considered a nonsubstance addiction in ICD-11 by the World Health Organization (6). Despite the presence of different classifications and criteria for its diagnosis,

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IGD is increasingly considered an important public health problem (7). IGD is a more common problem among young individuals (8–10). The prevalence of IGD was found to be between 0.21% and 57.50% in general populations (11).

According to DSM-5, IGD can be diagnosed when at least 5 of the 9 specified symptoms are present within 12 months. These symptoms are determined as the predominancy of the games in everyday life, feeling of anxiety when games are not played, increased behavior of wasting time, loss of interest in daily life activities, inability to quit the game despite the problems experienced, the tendency toward gaming for relaxation and avoiding negative mood, and experiencing significant losses in life (5). Besides, certain psychiatric problems can be encountered in association with IGD. Studies have drawn attention to the relationship of IGD with depression, anxiety, and hyperactivity (12). Nonetheless, depression is the most frequently reported problem related to health in individuals with IGD (11). A systematic review demonstrated that individuals with depressive symptoms were almost three times more likely to have internet addiction compared with individuals without depressive symptoms (13). Depression is important in terms of the risk of suicide (14) and academic failure (15). The relationship between IGD and depression has been examined in many studies (16–18); however, it is not easy to explain the cause-and-effect relationship between IGD and depression. While IGD is considered to cause depression, individuals with depression can also play games for a long time (19). On the other hand, the relationship between IGD and subjective well-being (SWB) presents a different perspective.

There is a negative relationship between the pathological use of online games and SWB (20). Low SWB can increase the risk of IGD (21). Accordingly, life satisfaction is associated with a lower level of IGD (22). SWB includes positive affect, negative affect, and life satisfaction (23). Therefore, life satisfaction is a part of SWB and creates a cognitive aspect of happiness. Positive and negative affects constitute the affective aspect of SWB. Playing games can lead to positive affective changes in an individual (24). On the other hand, individuals tend to play games more due to compensatory behaviors, which aim to deal with negative affections (25). Furthermore, happiness is a negative predictor of IGD (26). Low level of real-life satisfaction and a high level of basic psychological need satisfaction during gaming increase the risk of IGD (24). There is a

negative relationship between satisfying basic psychological needs in the real world and IGD (27).

According to the Self-Determination Theory (SDT), individuals try to satisfy three psychological needs in their lives. These needs are relatedness, autonomy, and competence (28). Satisfying the psychological needs contributes to the physical, mental, and psychological health of the individuals (28). Also, it is important for self-regulation and coping skills (29). Unsatisfaction of the basic psychological needs can increase the duration of playing and lead to IGD (30).

Basic psychological needs defined according to SDT can also be satisfied through computer games. Computer games are designed to satisfy these three basic needs of gamers (24). The sense of control in the game can contribute to satisfying the need for autonomy, the need to be connected to social relationships, and the challenge for development. The game becomes enjoyable to the extent that it can satisfy the needs of the gamer (31). This contributes to SWB by enabling the gamer to feel better.

The literature has demonstrated that new studies should be conducted to obtain more information to determine the risk factors and protective factors related to IGD. This study was conducted to clarify the relationships between depression, life satisfaction, basic psychological need satisfaction, negative affect, and IGD. It also examined the mediating role between IGD and depression. To the best of our knowledge, the relationships between IGD, depression, negative affect, life satisfaction, and basic psychological need satisfaction have not been directly examined yet. The primary aim of the current study was to investigate the link between basic psychological need satisfaction, IGD, and depression. The study would contribute to determining the increasingly common factors associated with IGD and knowing the most significant variables.

We hypothesized that (a) basic psychological need satisfaction (autonomy, relatedness, and competence) is positively associated with life satisfaction; (b) life satisfaction is negatively associated with IGD; (c) life satisfaction mediates the relationship between the basic psychological need satisfaction (autonomy, relatedness, and competence) and IGD; (d) IGD is positively associated with negative affect; (e) negative affect is positively associated with depression; (f) negative affect mediates the relationship between IGD and depression; and (g) basic psychological need satisfaction (autonomy, relatedness, and competence) is negatively associated with (g-1) negative affect and (g-2) depression.

METHOD

Participants

Participants were 339 voluntary university students (216 females and 123 males). Inclusion criteria were as follows: being a college student and playing digital games (244 participants mentioned that they played digital games). Exclusion criteria were as follows: not playing any digital games (95 participants did not play any digital games). Participants were recruited from Fatih Sultan Mehmet Vakıf University between November 2018 and January 2019. The data were collected inside the classrooms. Before collecting the data, permission was obtained from the ethics committee of Fatih Sultan Mehmet Vakıf University. The forms were handed out to the volunteering students. Descriptive statistics of the participants are presented in Table 1.

Measurement Tools

In this study, Personal Information Form, Internet Gaming Disorder-Short Form (IGD-SF), Basic Psychological Need Satisfaction Scale (BPNSS), Negative Affect Scale, The Satisfaction with Life Scale, and Zung Self-Rating Depression Scale were used as data collection tools. These scales are described in the following sections.

Personal Information Form

In the Personal Information Form, students were asked about their gender and questions such as whether they played digital games, the gaming platform they used (Play Station, computer, tablet, and smartphone), how much time they spent on these platforms (less than 1 h, between 1 and 7 h, between 8 and 14 h, and longer than 14 h). In addition, they were asked about how they perceived their academic achievement levels (poor, moderately successful, and successful).

Internet Gaming Disorder-Short Form (IGD-SF)

This scale is the short form of the scale that was developed by Pontes and Griffiths (32) based on the criteria of internet game playing disorder according to DSM-V. IGD-SF is a 5-point Likert-type scale consisting of 9 items (1: never; 5: very often). The minimum score that can be obtained from the scale is 9, and the maximum score is 45. The scale was adapted into Turkish by Arıca et al. (33). In the adaptation study of the scale, Cronbach's alpha reliability coefficient was calculated as 0.82. In the present study, the reliability coefficient was found as 0.90.

Table 1: Descriptive statistics

Variable	Value	n	%
Sex	Female	131	53.7
	Male	113	46.3
Grade	Grade 1	58	23.8
	Grade 2	75	30.7
	Grade 3	76	31.1
	Grade 4	14	6.7
	N/A	21	8.6
Achievement	Poor	8	3.43
	Moderately successful	154	63.1
	Successful	81	33.2
	N/A	1	0.27
Platform	Play Station	27	11.1
	Desktop computer	35	14.3
	Tablet	5	2.0
	Smartphones	171	70.1
	N/A	6	2.5
Duration	<1 h	97	39.8
	1–7 h	107	43.8
	8–14 h	32	13.1
	>14 h	8	3.3

Basic Psychological Need Satisfaction Scale (BPNSS)

Deci and Ryan (34) developed BPNSS, and it was adapted into Turkish by Bacanlı and Cihangir-Çankaya (35). It is a 7-point Likert-type scale (1: not at all true; 7: very true). The minimum score that can be obtained from the scale is 21, and the maximum score is 147. A high score indicates the satisfaction of basic psychological needs (34). The scale has three subdimensions, which are autonomy, relatedness, and competence. Cronbach's alpha reliability coefficient of the subdimensions was calculated as 0.71, 0.74, and 0.60, respectively (35). In the present study, it was calculated as 0.74, 0.71, and 0.71, respectively.

Negative Affect Scale

Watson et al. (36) developed the Positive and Negative Affect Schedule (PANAS). The scale consists of 10 positive and 10 negative affects. In the present study, only the negative affect subdimension was used. It is a 5-point Likert-type scale (1: very slightly or not at all; 5: extremely). It was adapted into Turkish by Gençöz (37). In this adaptation study, Cronbach's alpha internal consistency coefficient was found as 0.86 for the negative affect subdimension (37). In the present study, Cronbach's alpha coefficient was calculated as 0.79.

The Satisfaction with Life Scale (SWLS)

It was developed by Diener et al. (23) to measure the level of life satisfaction. It is a 7-point Likert-type scale consisting of 5 items. The validity and reliability studies were repeated in the Turkish culture, and Cronbach's alpha reliability coefficient of SWLS was calculated as 0.83 (38). In the present study, the reliability was calculated as 0.87.

Zung Self-Rating Depression Scale

The scale was developed by Zung (39), and it was adapted into Turkish by Gençdoğan (40) with the university students without any pathological findings. It is a 4-point Likert-type scale consisting of 20 items (1: a little of the time; 2: some of the time; 3: good part of the time; 4: most or all of the time). High scores obtained from the scale indicate a high level of depression. Cronbach's reliability coefficient was calculated as 0.80 for healthy individuals. In the present study, the reliability coefficient was calculated as 0.78.

Data Analysis

In the study, the measurement and structural models were tested using the maximum-likelihood method on LISREL 8.8 (41). The results of the χ^2 test and fit indices were examined to determine the goodness of fit for the models. Hu and Bentler (42) recommended that the Comparative Fit Index (CFI) and Goodness-of-Fit Index (GFI) values should be higher than or equal to 0.90; the root mean square error of approximation (RMSEA) value should be lower than or equal to 0.06, and the standardized root mean square residual (SRMR) value should be lower than or equal to 0.08 to indicate an acceptable fit to the data. Data analysis was conducted in two phases: as recommended by various authors [i.e., Anderson and Gerbing (43)] and the measurement model was tested before the structural model.

RESULTS

Descriptive Statistics

Descriptive statistics of the participants are presented in Table 1. Of the 244 students who mentioned that they played digital games, 131 were females (53.7%) and 113 were males (46.3%). Among these students, 58 were enrolled in Grade 1 (23.8%), 75 were enrolled in Grade 2 (30.8%), 76 were enrolled in Grade 3 (31.1%), and 14 were enrolled in Grade 4 (5.7%). The remaining 21 students did not mention their grade levels (8.6%). The question on

how they perceived their levels of academic achievement was responded as poor by 8 students (3.3%), as moderately successful by 154 students (63.1%), and as successful by 81 students (33.2%). One student did not respond to this question. Of the students, 27 (11.1%) played games on Play Station, 35 (14.3%) played games on desktop computers, 5 (2%) played games on tablets, and 171 (70.1%) played games on smartphones. Six students (2.5%) did not mark any gaming platforms. When the participants were asked about the duration of playing digital games, 97 (39.8%) responded as less than 1 h, 107 (43.9%) responded as between 1 and 7 h, 32 (13.1%) responded as between 8 and 14 h, and 8 (3.3%) responded as longer than 14 h.

The mean and standard deviation of the observed variables and their relationships are presented in Appendix I (44).

The measurement model refers to the relations of the latent variables with their respective indicators. The indicators in the model were defined according to the factor structures of the latent variables. To prevent the covariance of the error in terms of the basic psychological needs (competence, autonomy, and relatedness), each variable was entered into the model separately (see Model 1, Model 2, and Model 3). In Model 1, the latent variables were autonomy, IGD, negative affect, life satisfaction, and depression. The latent variables in Model 2 were relatedness, IGD, negative affect, life satisfaction, and depression. In Model 3, the latent variables were competence, IGD, negative affect, life satisfaction, and depression. As shown in Table 2, each latent variable except for depression was represented with the items of the scales. Depression had four parcels using the items of the BPNSS. Russell et al. (45) and Little (46) suggested that using item parcels had several advantages over using individual item scores. For instance, it improved the distribution of the measured variables and the fit of the model by decreasing the number of parameters to be estimated. As presented in Table 2, Models 1 and 3 consisted of 34 indicators, and Model 2 consisted of 37 indicators.

Test of Measurement Models

The fit statistics of the measurement model were as follows: [$\chi^2(1154, n=244)=2775.44, p<0.001; IFI=0.92; CFI=0.92; SRMR=0.076; RMSEA=0.076$ (90% CI for $RMSEA=0.72, 0.080$)]. The relationships between the implicit variables of the measurement model are presented in Table 3.

Table 2: Items/parcels of proposed models

Model 1 (autonomy model)	Model 2 (relatedness model)	Model 3 (competence model)
Autonomy Subscale of BPNSS (6 items)	Relatedness Subscale of BPNSS (9 items)	Competence Subscale of BPNSS (6 items)
Items of the IGD-SF (9 items)	Items of the IGD-SF (9 items)	Items of the IGD-SF (9 items)
Negative affect (10 items)	Negative affect (10 items)	Negative affect (10 items)
Life satisfaction (5 items)	Life satisfaction (5 items)	Life satisfaction (5 items)
Depression (4 parcels)	Depression (4 parcels)	Depression (4 parcels)
Total=34 items	Total=37 items	Total=34 items

BPNSS: Basic Psychological Need Satisfaction Scale; IGD-SF: Internet Gaming Disorder-Short Form.

Table 3: Means, standard deviations, and correlations among the latent variables

	M	SD	1	2	3	4	5	6	7
1. Autonomy	30.72	5.98	1						
2. Relatedness	48.08	9.52	0.8	1					
3. Competence	29.81	5.72	0.76	0.85	1				
4. IGD	15.15	6.5	0.24	0.27	0.24	1			
5. NA	24.49	5.78	0.66	0.49	0.62	0.29	1		
6. LS	22.63	5.64	0.53	0.5	0.62	-0.32	0.42	1	
7. Depression	40.74	7.8	-0.71	0.59	0.66	0.32	0.81	0.61	1

M: Mean; SD: Standard deviation; IGD: Internet Gaming Disorder; NA: Negative affect; LS: Life satisfaction.

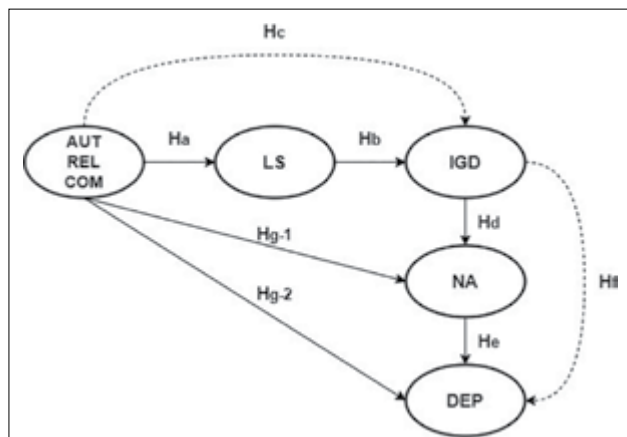


Figure 1. Proposed structural equation model.

AUT: Autonomy; REL: Relatedness; COM: Competence; LS: Life satisfaction; IGD: Internet Gaming Disorder; NA: Negative affect; DEP: Depression.

Test of Structural Models

The structural model shown in Figure 1 was tested by considering each need as an independent variable. The fit statistics of the structural equation model for autonomy (Fig. 2) were as follows: [$\chi^2(554, n=244)=1337.04, p<0.001; IFI=0.94; CFI=0.94; SRMR=0.078; RMSEA=0.076$ (90% CI for RMSEA=0.071, 0.081)]. When Hc was tested in this model, a path was

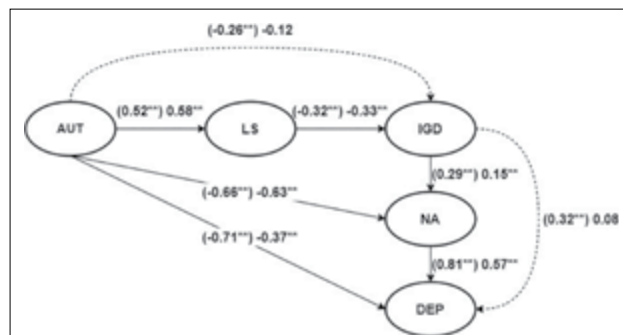


Figure 2. Structural equation model for autonomy.

AUT: Autonomy; LS: Life satisfaction; IGD: Internet Gaming Disorder; NA: Negative affect; DEP: Depression.

drawn from autonomy to IGD, and this path was not observed to be significant ($\beta=-0.12, t=-1.23$). In this case, it can be argued that the relationship between autonomy and IGD was achieved with the mediation of life satisfaction. When Hf was tested in this model, a path was added from IGD to depression, and this path was not significant ($\beta=0.08, t=1.46$). In this case, it can be said that the negative affect mediated the relationship between IGD and depression. Besides, the path from autonomy to depression declined from -0.71 to -0.37. As shown in Figure 2, the other hypotheses were also confirmed.

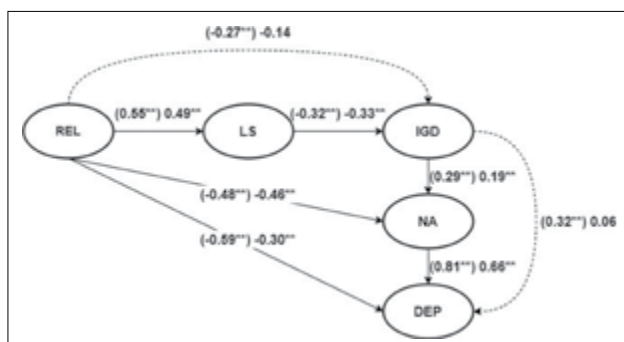


Figure 3. Structural equation model for relatedness.

REL: Relatedness; LS: Life satisfaction; IGD: Internet Gaming Disorder; NA: Negative affect; DEP: Depression.

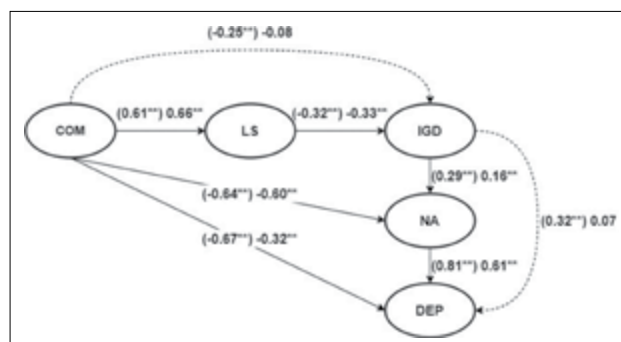


Figure 4. Structural equation model for competence.

COM: Competence; LS: Life satisfaction; IGD: Internet Gaming Disorder; NA: Negative affect; DEP: Depression.

The fit statistics of the structural equation model for relatedness (Fig. 3) were as follows: [$\chi^2(659, n=244)=1633.54, p<0.001$; IFI=0.92; CFI=0.92; SRMR=0.082; RMSEA=0.078 (90% CI for RMSEA=0.073, 0.083)]. When Hc was tested in this model, a path was drawn from relatedness to IGD, and this path was not observed to be significant ($\beta=-0.14, t=-1.57$). In this case, it can be claimed that the relationship between relatedness and IGD was mediated by life satisfaction. When Hf was tested in this model, a path was added from IGD to depression, and this path was not significant ($\beta=0.06, t=1.14$). In this case, it can be claimed that the negative affect mediated the relationship between IGD and depression. In addition, the path from relatedness to depression declined from -0.59 to -0.30. As shown in Figure 3, the other hypotheses were also confirmed.

The fit statistics of the structural equation model for competence (Fig. 4) were as follows: [$\chi^2(554, n=244)=1287.12, p<0.001$; IFI=0.94; CFI=0.94; SRMR=0.074; RMSEA=0.074 (90% CI for RMSEA=0.069, 0.079)]. When Hc was tested in this model, a path was drawn from competence to IGD, and this path was not observed to be significant ($\beta=-0.08, t=-0.76$). In this case, it can be argued that the relationship between competence and IGD was achieved with the mediation of LS. When Hf was tested in this model, a path was added from IGD to depression, and this path was not significant ($\beta=0.07, t=1.34$). In this case, it can be claimed that the negative affect mediated the relationship between IGD and depression. Also, the path from competence to depression declined from -0.67 to -0.32. As shown in Figure 4, the other hypotheses were also confirmed.

DISCUSSION

We found that the relationship between basic psychological needs and IGD was mediated by life satisfaction. Besides, it was concluded that negative affect mediated the relationship between IGD and depression. As a result of the study, all hypotheses were confirmed.

The relationship between satisfaction of basic psychological needs and life satisfaction was found to be significant as presented in previous studies. It has been revealed in many studies that satisfaction of basic psychological needs is a predictor of life satisfaction (47–49). Life satisfaction mediated the relationship between basic psychological needs and IGD. Satisfaction of basic psychological needs was negatively correlated with IGD (21,50). Satisfaction of basic psychological needs of individuals increases their level of satisfaction with life, which leads to the decline of IGD. This result indicated that it was necessary to look at whether basic psychological needs provided life satisfaction to decrease the level of IGD. Also, studies indicated that the deficiency of basic psychological needs was related to depression through IGD (51–53). The level of life satisfaction and IGD are inversely proportional. This study demonstrated that the variables of life satisfaction and negative affect, which mediated this relationship, were of critical importance. Here, the model we proposed indicated that the contribution of satisfaction regarding the competence, autonomy, and relatedness provided by the environment was effective in IGD.

Negative affect mediated the relationship between IGD and depression. There were studies indicating depression as the companion of IGD (54). In addition, some studies concluded that IGD could

further lead to certain psychiatric problems such as depression, panic disorder, and social phobia (55). Looking at the relationship between IGD and depression, the type of affect created by IGD was observed to be significant (54). Depression is a disorder characterized by an increase in negative affect. Studies have revealed that depression can be accompanied by negative affect (56,57). Naturally, the level of depression could increase as a result of negative affects experienced by gaming individuals. These results were also consistent with the results of this study. Another question to ask would be whether gaming could cause a positive affect. In this context, it may be beneficial to review the satisfaction of the basic psychological needs during the game. The model of basic psychological need satisfaction during gaming was presented by Rigby and Ryan (24). STD's literature revealed that the games contributed to the satisfaction of basic psychological needs (58). In other words, games were designed to satisfy the competence, autonomy, and relatedness needs. Although there have been various studies on basic psychological needs during gaming, the interaction of satisfaction and dissatisfaction of daily needs increases the duration of problematic gaming (59). Therefore, it was observed that satisfaction of basic psychological needs was important for mental health during both gaming and the course of everyday life. Similarly, Allen and Anderson (60) demonstrated that satisfaction or dissatisfaction of the needs in daily life was more important compared to satisfying the needs during gaming.

Finally, it was found that the relationship between basic psychological needs and IGD was mediated by life satisfaction. Also, it was concluded that negative affect mediated the relationship between IGD and depression. The relationship between life satisfaction and negative affect could be examined in more comprehensive qualitative studies. In addition, Mills and Allen (61) emphasized the importance of self-control in the relationship between satisfaction of basic psychological needs and IGD. The inclusion of self-control in this model could provide more information.

Further to the conclusion that IGD led to depression, it was revealed that the satisfaction of basic psychological needs in daily life was strongly associated with negative affect and depression. In the present study, in addition to the relationship of IGD with negative affect and depression, the

importance of satisfaction of basic psychological needs for IGD was emphasized as much as its importance for mental health. Naturally, computer games can also be associated with well-being; however, as indicated by Mills and Allen (61), balance in life is of great essence. In other words, it is important to satisfy the competence, relatedness, and autonomy needs of the youth in real life in terms of both IGD and depression.

This study presented a new model in terms of demonstrating that the satisfaction of basic psychological needs was essential for IGD because it affected life satisfaction, which could lead to depression and negative affect. The types of games that were played were not asked in the present study. Whether the game is multiplayer or single-player could also have an impact on the effect (52). Besides, the satisfaction of basic psychological needs during gaming was also not addressed.

The study has some limitations. First of all, only university students were included in the study. For this reason, studies in different age groups are required to confirm our findings. It also needs to be studied with a larger sample. Second, we limited the demographic variables in the study. Different variables can be added in future studies. For example, participants were not asked about their presence of comorbid psychiatric conditions. In future research, asking about the presence of comorbid psychiatric conditions of the participants may provide more detailed information about IGD.

In conclusion, our study had some theoretical and practical outcomes. In our study, we tried to determine the predictors of IGD. We found that negative affect mediated the relationship between IGD and depression. In addition, life satisfaction was found to have a mediating role in the relationship between basic psychological need satisfaction and IGD. Our results may help the healthcare professionals of mental health, who deal with the treatment of IGD, and the planning of the preventive activities, which may be related to the predictors of IGD.

Contribution Categories		Author Initials
Category 1	Concept/Design	N.D.C., F.Y.
	Data acquisition	F.Y.
	Data analysis/Interpretation	N.D.C., B.C.
Category 2	Drafting manuscript	N.D.C., F.Y.
	Critical revision of manuscript	N.D.C., B.C.
Category 3	Final approval and accountability	N.D.C., F.Y., B.C.
Other	Supervision	B.C., N.D.C.

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Ethical Approval: The Fatih Sultan Mehmet Vakıf University Ethics Committee granted approval for this study (date: 08.03.2017, number: FSMVÜ.İDD.FR-058/00).

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