



An Evaluation of the Factors Related to Internet Gaming Disorder in Young Adults

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Abstract

Background: Game addiction is a growing problem all over the world. The present study aimed to evaluate the prevalence and psychological, social, and behavioral effects of internet gaming disorder (IGD) on young adults.

Methods: A preliminary study was conducted and the game types most commonly played on the internet were determined. Then, approximately 60 gaming site managers were contacted. After obtaining consent, the questionnaires were sent to gaming site members and they were asked to complete the questionnaires. Data were collected through a sociodemographic form, Internet Gaming Disorder Scale-Short Form (IGDS9-SF), Strengths and Difficulties Questionnaire (SDQ), and State-Trait Anxiety Inventory (STAI).

Findings: The study was conducted with 613 participants. The age of the participants ranged from 15 to 30 years, with a mean age of 20.80 ± 4.63 years. The prevalence of IGD was 10% ($n=67$). Those with low-income families and low academic performance were identified as more likely to develop IGD. Moreover, IGD was revealed to be more likely in individuals with fewer close friends, playing games from an early age, and those with a habit of devoting extensive time to watching online game videos on Twitch or YouTube. In addition, the risk of gaming disorder was approximately two times higher in individuals who preferred First Person Shooter (FPS) games and Massively Multiplayer Online Role-Playing Games (MMORPG).

Conclusion: The results of this study could be useful for estimating the level of IGD and carrying out more comprehensive studies to possibly be able to control IGD.

Keywords: Internet gaming disorder, Social media, Young adults

Citation: Ünal E, Gökler ME, Turan Ş. An evaluation of the factors related to internet gaming disorder in young adults. *Addict Health*. 2022;14(4):279-287. doi:10.34172/ahj.2022.1381

Received: June 1, 2022, Accepted: October 8, 2022, ePublished: October 29, 2022

Introduction

Technology and internet have evolved and progressed at an incredible pace over the past years.¹ These rapid developments have particularly resulted in greater opportunities for internet access for individuals across the globe as well as significant changes to daily habits.² Game habits among young adults have been particularly impacted by these developments, with game platforms moving from the street to the screen.

In recent years, there has been a growing population of young adults opting to play video games for entertainment and spending significant amounts of their time in front of screens. According to the data provided by the Common Sense Census in 2019, adolescents aged 8-12 spend an average of 4.5 hours, and adolescents aged 13-18 spend approximately 7 hours a day in front of the screen.³ The concept of online game addiction first emerged in the 1990s, and many researches have been carried out on this subject to date.

Internet gaming disorder (IGD) was included in the Diagnostic and Statistical Manual of Mental Disorders,

Fifth Edition (DSM-5) in 2013 as a condition that needs further research.⁴ Nine diagnostic criteria for IGD were defined in the DSM-5 with five or more of these criteria required for a diagnosis. Furthermore, in the 11th Revision of the International Classification of Diseases (ICD-11), IGD was listed as a new disorder by the World Health Organization.⁵

There are several sociodemographic risk factors associated with IGD, including male gender, low family support, low-quality family relationships, high rates of family conflicts, and low psychosocial support.^{6,7} Some further risk factors for IGD also include social frustration and weakness, fear of missing opportunities, desire to protect in-game reputation, and the instinct to protect against harm.⁷ The amount of money spent on weekly playing, impulsivity, low willpower, and anxiety were identified as other risk factors for IGD in the literature.⁸ Game-related characteristics, such as escaping from real life, competing with others, leveling up by accumulating rewards, and game character development were also determined as risk factors.⁹ Moreover, depression,



loneliness, social anxiety, low academic success, smoking, and alcohol and substance abuse, were found to be more common in game addicts.¹⁰ It could be predicted that spending childhood and adolescence, arguably the most productive periods of human life in terms of development and education, playing excessive online games may cause isolation from society and various psychiatric problems in adulthood. Problematic gaming behavior has also been shown to negatively affect social and daily life, reducing academic performance.

IGD is more common in childhood and adolescence, though there are varying accounts of the prevalence of IGD. In a study conducted in Germany, the prevalence of IGD was 7.6% among those under 19 years of age and it was found to be 3.7% for those over 20.¹¹ In a systematic review, the prevalence of IGD varied between 0.7%-27.5%.¹² Furthermore, in a study involving approximately 6000 people in South Korea, the prevalence of IGD was found to be 13.8%.¹² In a meta-analysis study conducted in 2018 with approximately 62 000 participants, the total prevalence was found to be 4.6%.¹³ In another study conducted in Germany with participants between 12-25 years of age, the prevalence was found to be 8.4% in men, 2.9% in women, and 5.7% in total.¹⁴

As a result of the restrictions across the globe during the COVID-19 pandemic, it was expected that online activities, such as playing online games especially First Person Shooter (FPS) and Massively Multiplayer Online Role-Playing Games (MMORPG) would increase particularly in the young population.¹⁵ In a study by King et al, it was stated that the stay-at-home restrictions and quarantine rules due to COVID-19 increased the frequency of online gaming.¹⁶

In the literature, there are some studies on social networking sites usage¹⁷; however, research on game players registered to social media game sites is limited. The present study is original in that it shows the game addiction status of young people who are members of social media game groups that appeal to large audiences and play games actively. Given these findings in the literature, this study aimed to contribute to the literature in investigating gaming disorder in young adults during the COVID-19 pandemic in Turkey. Accordingly, this study aimed to evaluate the psychological, social, and behavioral factors related to IGD in Young Adults.

Methods

This descriptive study aimed to evaluate the prevalence of IGD and its associated variables in a sample aged 18-25 years. A preliminary study was conducted and the game types most commonly played on the internet were determined by asking the opinions of two academics experienced in internet games.

Participants and procedure

The total number of registered players on social media and

forum sites for the games was determined. The minimum sample size was calculated as 154 people ($1-\beta$: 0.95, α : 0.05). In this study, it was aimed to reach approximately 600 participants in total. At first, the research team signed up in social network gaming sites across Turkey. Afterwards, approximately 60 social network gaming site managers were contacted and information was requested for the study. The necessary permissions were obtained verbally from the social network gaming site managers in order to share the study questionnaire with site members. After obtaining consent from the members, the questionnaires were sent to them online and they were asked to complete the questionnaires. No personal information related to the participants was requested. The survey took approximately 15-20 minutes to complete.

Data collection tools

A sociodemographic data form (including items on gender, school, family, marital status, family income, family education status, family harmony, academic performance, relationship with classmates, profiting from online games, willingness to play games after returning home from school, restrictions to play online games, and status of lying due to online games) was used in this study.

Internet Gaming Disorder Scale-Short Form (IGDS9-SF): IGDS9-SF evaluates the symptoms, severity, and significant effects of IGD by examining the individual's playing activities over a 12-month period. This is a 9-item scale developed by Pontes and Griffiths.¹⁸ The Turkish validity and reliability study was conducted by Evren et al.¹⁹ The Cronbach's alpha value of the Turkish version of the scale was found to be 0.894. The scores that can be obtained from the five-point Likert scale, range from 9 to 45 with higher scores indicating higher gaming disorder and a score of 36 or above indicating a predictor of IGD.^{18,19}

Strengths and Difficulties Questionnaire (SDQ): SDQ is a 25-item questionnaire developed by Goodman, which aims to screen mental difficulties in children and adolescents.²⁰ The questionnaire consists of 25 questions and 5 subfields (emotional symptoms, hyperactivity, conduct problems, peer problems, prosocial behavior). The Turkish validity and reliability study of the questionnaire was carried out by Güvenir et al.²¹ The Cronbach's alpha value of the Turkish version of the scale was expressed as 0.730 for adolescents. Scores on each subfield of the scale range from 0 to 10. The total score of the scale is obtained by adding the scores of the 4 subgroups up (min 0 – max 40). In addition, according to the scores obtained from each subfield of the scale, individuals are divided into 3 groups as normal, borderline, and abnormal. Those with 0-11 points in the total score of SDQ are called normal, having 12-15 points are called borderline, and having points between 16-40 are called abnormal. The cut-off points also vary in the

subfields.²⁰

State-Trait Anxiety Inventory (STAI): The STAI is used to measure the presence and severity of anxiety symptoms and general anxiety tendencies. This 20-item self-report questionnaire includes two subscales (state and trait). First, the state-anxiety subscale (STAI-S) evaluates the current state of anxiety and asks how participants feel “right now”. The trait-anxiety subscale (STAI-T) evaluates relatively stable aspects of “anxiety tendency”. Increased scale scores show the presence of higher levels of anxiety. The score for the STAI questionnaire ranges from 20 to 80 and is split into four groups including no anxiety (0-20), mild anxiety (21-39), moderate anxiety (40-59), and severe anxiety (60-80). An abnormal score of STAI is considered when ≥ 40 . The Turkish validity and reliability study of this scale was conducted by Öner and Le Compte.²² The Cronbach’s alpha coefficient was identified between 0.94 - 0.96 for state-anxiety and 0.83-0.87 for trait-anxiety.

The data were analyzed using IBM-SPSS software (version 22.0). The frequency and percentage values were used to present descriptive data. Median and interquartile range (IQR) 25-75 values were used for evaluating group scores. Binary and Multivariate logistic regression analysis were also used to examine the variables that may affect dependency in addicted and non-addicted individuals. When the dependent variable is categorical, logistic regression analysis is used to evaluate the crude and adjusted effects of the independent variables on the dependent variable. For this reason, the sociodemographic variables that may have an effect on the presence of IGD, the dependent variable, were first determined with univariate analysis and then, the variables with $P < 0.05$ in univariate analysis were included in the multivariate model. Two models (model 1 and model 2) were developed from independent variables that were found to be significant (for variables at $P \leq 0.05$ significance level in univariate analysis). Odds ratios and 95% confidence intervals were calculated. The statistical significance level was set at $P \leq 0.05$.

Results

Of the 613 participants included in the study, 98.2% were male. The age of the students ranged between 15 and 30 years, with a mean age of 20.80 ± 4.63 years. The prevalence of having IGD was 10.9% ($n = 67$). Those with bad family harmony [OR = 3.288 (1.537-7.032)], low academic performance [OR = 2.530 (1.180-5.425)], and poor relationship with classmates [OR = 4.027 (1.973-8.218)] were more likely to develop IGD. Furthermore, those with a history of making money through online games [OR = 1,786 (1.044-3.055)], a willingness to play online games after returning from school [OR = 7.574 (3.679-15.593)], a tendency to lie because of online gaming [OR = 3.974 (2.304-6.855)], a history of

committing a crime due to online gaming [OR = 7.547 (3.003-18.969)], and a tendency to delay their sleep due to online gaming [OR = 4.877 (2.187-10.876)] were more likely to develop IGD. According to the analysis, from among the sociodemographic characteristics, the variable most related to having IGD was willingness to play games after returning from school. IGD was observed seven times more in those with this feature. The distribution of students’ IGD status according to their sociodemographic characteristics and risk factors is presented in Table 1.

Those who had a low number of close friends [OR = 0.876 (0.805-0.954)], began online gaming at a younger age [OR = 0.877 (0.804-0.955)], and spent more time watching online game videos on Twitch or YouTube [OR = 1.670 (1.429-1.952)] were at greater risk of developing IGD. Furthermore, those who spent more time daily playing games [OR = 1.202 (1.127-1.281)], spent more money on online games [OR = 1.002 (1.001-1.003)], and increased their rate of online gaming throughout the COVID-19 pandemic [OR = 1.185 (1.055-1.331)] were at greater risk of developing IGD. A distribution of students’ IGD status according to their age and risky behavior is shown in Table 2.

The risk of gaming addiction was approximately two times higher in individuals who preferred FPS [OR = 2.104 (1.194-3.705)] and MMORPG [OR = 2.435 (1.456-4.073)]. It was revealed that other game types were not effective in developing IGD. A distribution of students’ IGD status according to their preferred game type is shown in Table 3.

Concerning the SDQ and its subgroups, appearing in the high-risk group based on SDQ total score [OR = 3.021 (1.428-6.391)], based on emotional symptoms [OR = 2.818 (1.088-7.300)], based on hyperactivity [OR = 3.983 (2.001-7.929)], and based on peer problems [OR = 3.962 (1.924-8.160)] were found to be related to a higher risk of developing IGD. A distribution of SDQ scale risk groups according to students’ IGD status is given in Table 4.

The scores of the STAI indicated that online game addicts were more anxious ($P < 0.05$). A distribution of the scores obtained from the STAI in relation to the IGD status of the students is presented in Table 5.

In model 1, those who had poor family harmony [OR = 4.600 (1.740-12.162)], were willing to play games after returning from school [OR = 3.503 (1.563-7.854)], lied due to online games [OR = 2.218 (1.135-4.333)], and started playing online games at an earlier age were at higher risk of developing gaming addiction [OR = 0.840 (0.745-0.948)]. Playing FPS [OR = 1.887 (1.022-3.484)] and MMORPG [OR = 2.434 (1.349-4.392)] and abnormal hyperactivity [OR = 2.521 (1.093-5.818)] remained significant in model 2. In adjusted model 1, the variable most associated with having IGD was found to be bad family harmony. Those with bad family harmony were about 5 times more likely to have IGD. In model 2, those who were hyperactive and played MMPORG were

Table 1. Distribution of students' IGD status according to sociodemographic characteristics and risk factors

		Having IGD				Crude OR (95% CI)
		No		Yes		
		No.	%	No.	%	
Gender	Male	538	98.5	64	95.5	1
	Female	8	1.5	3	4.5	3.152 (0.816-12.184)
Education	High school	222	40.7	24	35.8	1
	University	324	59.3	43	64.2	1.228 (0.724-2.081)
Family marital status	Married	436	79.9	53	79.1	1
	Divorced	79	14.5	9	13.4	0.937 (0.444-1.976)
	A parent has died	31	5.7	5	7.5	1.327 (0.495-3.559)
Family income status	1000-2000 TL	27	4.9	4	6.0	1
	2001-4000 TL	168	30.8	23	34.3	0.924 (0.296-2.881)
	4001-6000 TL	154	28.2	18	26.9	0.789 (0.248-2.512)
	6000 TL and above	197	36.1	22	32.8	0.754 (0.241-2.354)
Maternal education	<8 year	253	46.3	37	55.2	1
	≥8 year	293	53.7	30	44.8	0.700 (0.420-1.166)
Paternal education	<8 year	185	33.9	28	41.8	1
	≥8 year	361	66.1	39	58.2	0.714 (0.426-1.197)
Family harmony	Good	373	68.3	32	47.8	1
	Middle	134	24.5	24	35.8	2.088 (1.187-3.673)
	Bad	39	7.1	11	16.4	3.288 (1.537-7.032)
Academic performance	Good	317	58.1	26	38.8	1
	Middle	176	32.2	30	44.8	2.078 (1.191-3.626)
	Poor	53	9.7	11	16.4	2.530 (1.180-5.425)
Relationship with classmates	Good	365	66.8	27	40.3	1
	Middle	134	24.5	26	38.8	2.623 (1.478-4.656)
	Poor	47	8.6	14	20.9	4.027 (1.973-8.218)
Making Money from online games	No	416	76.2	43	64.2	1
	Yes	130	23.8	24	35.8	1.786 (1.044-3.055)
Willingness to play games after returning from school	No	295	54.0	9	13.4	1
	Yes	251	46.0	58	86.6	7.574 (3.679-15.593)
Restrictions posed by family to play online games	No	476	87.2	55	82.1	1
	Yes	70	12.8	12	17.9	1.484 (0.757-2.908)
Lying due to online games	No	352	64.5	21	31.3	1
	Yes	194	35.5	46	68.7	3.974 (2.304-6.855)
Being involved in crime due to online games	No	535	98.0	58	86.6	1
	Yes	11	2.0	9	13.4	7.547 (3.003-18.969)
Delaying sleep due to online games	No	198	36.3	7	10.4	1
	Yes	348	63.7	60	89.6	4.877 (2.187-10.876)

approximately 2.5 times more likely to have IGD. The variables related to IGD in the multivariate models are shown in Table 6.

Discussion

The current study aimed to evaluate IGD, one of the most urgent public health problems resulting from social network gaming sites actively attracting vulnerable players. Many studies have been conducted on the

prevalence of gaming disorder. Karaca et al reported that the prevalence of game addiction among adolescents was 5.7% and the frequency of problematic gaming was 44% in Turkey.²³ Several international studies have shown that the prevalence of game addiction varies between 0.6% and 16.9%.²⁴⁻²⁸ According to the meta-analysis results of 53 studies conducted between 2009 and 2019 in 17 different countries around the world, the prevalence of gaming disorder was determined to be 3.05%.²⁹

Table 2. Distribution of students' IGD status according to age and risky behavior

	Having IGD		Crude OR (95% CI)
	No	Yes	
	Median (IQR 25-75)	Median (IQR 25-75)	
Age	20.0 (17.0-24.0)	20.0 (17.0-24.0)	1.008 (0.955-1.064)
Number of close friends	5.0 (3.0-8.0)	4.0 (2.0-5.0)	0.876 (0.805-0.954)
Online game starting age	9.0 (7.0-12.0)	8.0 (7.0-10.0)	0.877 (0.804-0.955)
Time to watch online game videos on Twitch or YouTube	1.0 (1.0-2.0)	2.0 (1.0-4.0)	1.670 (1.429-1.952)
Average daily online game playing time	4.0 (3.0-6.0)	7.0 (4.0-10.0)	1.202 (1.127-1.281)
Amount of money spent on online games	10.0 (0.0-50.0)	50.0 (0.0-150.0)	1.002 (1.001-1.003)
Additional time playing online games after COVID-19 epidemic	2.0 (1.0-4.0)	3.0 (2.0-5.0)	1.185 (1.055-1.331)

Table 3. Distribution of students' IGD status according to preferred game type

		Having IGD				Crude OR (95% CI)
		No		Yes		
		No.	%	No.	%	
FPS	No	238	43.6	18	26.9	2.104 (1.194-3.705)
	Yes	308	56.4	49	73.1	
TPS	No	310	56.8	42	62.7	0.182 (0.463-1.319)
	Yes	236	43.2	25	37.3	
RPG	No	330	60.4	38	56.7	1.166 (0.698-1.974)
	Yes	216	39.6	29	43.3	
MMORPG	No	355	65.0	29	43.3	2.435 (1.456-4.073)
	Yes	191	35.0	38	56.7	
MOBA	No	287	52.6	32	47.8	1.212 (0.729-2.014)
	Yes	259	47.4	35	52.2	
RTS	No	432	79.1	57	85.1	0.665 (0.329-1.343)
	Yes	114	20.9	10	14.9	
TBS	No	462	84.6	60	89.6	0.642 (0.284-1.452)
	Yes	84	15.4	7	10.4	
Adventure	No	447	81.9	57	85.1	0.792 (0.391-1.605)
	Yes	99	18.1	10	14.9	
Simulation	No	372	68.1	50	74.6	0.727 (0.407-1.297)
	Yes	174	31.9	17	25.4	

The most played game types were FPS (First Person Shooter, e.g., Call of Duty and Battlefield), TPS (Third Person Shooter, e.g., GTA series, Metal Gear Solid series), RPG (Role-Playing Games, e.g., Witcher series Games like Skyrim series), MMORPG (Massively Multiplayer Online Role-Playing Games, e.g., Metin2, Knight Online and Silkroad), MOBA (Multiplayer Online Battle Arena, e.g., League of Legends, Counter Strike), RTS (Real-Time Strategy, e.g., Age Of Empires series and StarCraft series), TBS (Turn Based Strategy, e.g., Civilization and Total War series), Adventure (e.g., Old arcade style short games), and Simulation (e.g., SimCity, Euro Truck Simulator).

In the current study, the prevalence of IGD was found to be 10.92% among the study group, which included members of social network gaming sites. The literature suggests that people cope with their problems by playing online games. However, the prolonged and excessive use of online games can cause problems in their real-life relationships, resulting in anxiety, depression, and loneliness.^{30,31} In the present study, the risk of game addiction was higher in individuals with low-quality

family relationship and those having few close friends. Studies have reported that game addicts feel more isolated than non-addicts.^{32,33} Thus, similar to internet addiction, gaming disorder can increase the feelings of loneliness and isolation as online interactions cannot replace face-to-face contact.³³

Moreover, game addicts had higher scores on the STAI. Similar results have been reported in many studies.^{33, 34} Virtual relationships, which increase with the increase of screen time, may reduce the need for social relationships, often resulting in the development of mental problems, such as anxiety or functional loss.²³ Frölich et al found that gaming addiction was significantly associated with behavioral and emotional problems.³⁵ In the present study, emotional symptoms, hyperactivity, and peer problems were found to be risk factors for IGD. Attention deficit hyperactivity disorder (ADHD) has also been defined as a risk in the literature in terms of game disorder.^{33,35} Studies have reported that game disorder does not increase the risk for specific psychiatric disorders, such as ADHD, anxiety, and depression, hence suggesting that IGD should be evaluated as a separate psychiatric disorder. This leads to the understanding that, when combined with emotional and social problems, ADHD, anxiety, and depression can be comorbid conditions.^{35,36}

In a study conducted by Drummond and Sauer on more than 192000 students from 22 countries, and a study by Başdaş and Özbey in Turkey, it was reported that students with IGD had lower academic performance.^{34,37} Similarly, in the present study, academic performance was found to be lower in the addicted group. In addition, this study showed that the risk of IGD was found to be approximately 7.5 times higher in students who wanted to play games after school, while the risk was found to be approximately 5 times higher for individuals who delayed their sleep. Spending more time playing games instead of studying and even delaying sleep may be the reasons for adolescents' low academic performance.

In this study, it was determined that individuals who started playing games at a younger age, had higher average daily playing time, and increased their gaming time after the COVID-19 pandemic, were at higher

Table 4. Distribution of SDQ risk groups according to students' IGD status

		Having IGD				Crude OR (95% CI)
		No		Yes		
		No.	%	No.	%	
SDQ Total Score	Normal	131	24.0	9	13.4	1
	Borderline	203	37.2	14	20.9	1.004 (0.422-2.386)
	Abnormal	212	38.8	44	65.7	3.021 (1.428-6.391)
Emotional symptoms	Normal	503	92.1	51	76.1	1
	Borderline	22	4.0	10	14.9	4.483 (2.012-9.988)
	Abnormal	21	3.8	6	9.0	2.818 (1.088-7.300)
Hyperactivity	Normal	468	85.7	47	70.1	1
	Borderline	43	7.9	6	9.0	1.389 (0.562-3.435)
	Abnormal	35	6.4	14	20.9	3.983 (2.001-7.929)
Conduct problems	Normal	436	79.9	48	71.6	1
	Borderline	51	9.3	9	13.4	1.603 (0.743-3.458)
	Abnormal	59	10.8	10	14.9	1.540 (0.739-3.206)
Peer problems	Normal	384	70.3	35	52.2	1
	Borderline	126	23.1	19	28.4	1.654 (0.914-2.995)
	Abnormal	36	6.6	13	19.4	3.962 (1.924-8.160)
Prosocial behavior	Normal	474	86.8	57	85.1	1
	Borderline	47	8.6	3	4.5	0.531 (0.160-1.761)
	Abnormal	25	4.6	7	10.4	2.328 (0.964-5.625)

Table 5. Distribution of the scores obtained from STAI according to IGD status of students

	Having IGD		Crude OR (95% CI)
	No	Yes	
	Median (IQR 25-75)	Median (IQR 25-75)	
State Anxiety Inventory	43.0 (39.0-47.0)	45.0 (41.0-50.0)	1.070 (1.027-1.116)
Trait Anxiety Inventory	47.0 (43.0-53.0)	52.0 (46.0-58.0)	1.075 (1.043-1.107)

risk of developing IGD. It has been reported that both problematic gaming and IGD are associated with the increase in time spent in front of the computer. Many studies in the literature support these findings.^{35,36,38,39} Wang et al showed that IGD is closely related to the money spent on games and spending persistence.⁴⁰ In the current study, it was determined that individuals who earn money from games or spend more money are at higher risk of developing IGD.

Adolescents often play games for fun, not to make money.⁴⁰ It has been demonstrated that spending money constantly is an important indicator of IGD. The results of the current study showed that individuals who work and earn money are at higher risk of developing IGD. In recent years, websites such as Twitch, YouTube, and their contemporaries have developed rapidly with the emergence of various live streaming platforms.⁴¹ The total screen time of these videos have been reported to be 434 billion minutes, with at least 1 million individuals

watching live streams on Twitch at any given time, according to statistics until 2018.⁴¹ In this study, watching game videos on Twitch or YouTube increased the risk of IGD by approximately 1.7 times. While the number of views on social media and interaction with others increased, viewers who identified themselves with the streamers, increased their desire to play and this contributed to being an IGD.⁴²

There are different kinds of online games that are considered within the scope of IGD. Some of these include MMORPG, Role-Playing Game (RPG), Real-Time Strategy (RTS), FPS, and Multiplayer Online Battle Arena (MOBA). Most of these games can be found online and players can play with their peers, communicate with each other online, and implement plans and tactics to win. For this reason, it is thought that the type of game played can also affect addiction. Eichenbaum et al reported that MMORPG as a game type is more closely related to the development of IGD than others.⁴³ Many studies have reported that MMORPG players are most prone to developing IGD.⁴⁴⁻⁴⁶ This type of game is considered the most time-consuming as a player spends an average of 25 hours a week on MMORPG.⁴⁴ Due to many tasks that require extensive cooperation, this type of game can have a more addictive potential than others. MMORPG is not the only game type associated with pathological use. RTS games such as FPS have also been associated with high levels of IGD.⁴⁷ The immersive nature of these games as well as their competitive potential, reward features, and

Table 6. The variables related to IGD in multivariate models

Model 1		Adjusted* OR (95% CI)
Family harmony	Good	1
	Middle	1.557 (0.786-3.085)
	Bad	4.600 (1.740-12.162)
Academic performance	Good	1
	Middle	1.250 (0.632-2.472)
	Poor	1.187 (0.464-3.032)
Making money from online games	No	1
	Yes	1.101 (0.536-2.261)
Willingness to play games after returning from school	No	1
	Yes	3.503 (1.563-7.854)
Lying due to online games	No	1
	Yes	2.218 (1.135-4.333)
Being involved in crime due to online games	No	1
	Yes	1.879 (0.533-6.629)
Delaying sleep due to online games	No	1
	Yes	2.060 (0.834-5.089)
Number of close friends		0.920 (0.845-1.001)
Online game starting age		0.840 (0.745-0.948)
Time to watch online game videos on Twitch or YouTube		1.558 (1.288-1.885)
Average daily online game playing time		1.071 (0.978-1.174)
Amount of money spent on online games		1.000 (0.999-1.001)
Additional time playing online games after COVID-19 epidemic		1.011 (0.878-1.164)
Model 2		Adjusted* OR (95% CI)
FPS	No	1
	Yes	1.887 (1.022-3.484)
MMORPG	No	1
	Yes	2.434 (1.349-4.392)
SDQ Total	Normal	1
	Borderline	0.940 (0.381-2.323)
	Abnormal	1.559 (0.608-3.997)
Emotional symptoms	Normal	1
	Borderline	1.979 (0.773-5.068)
	Abnormal	0.864 (0.253-2.956)
Hyperactivity	Normal	1
	Borderline	0.829 (0.296-2.320)
	Abnormal	2.521 (1.093-5.818)
Peer problems	Normal	1
	Borderline	1.232 (0.634-2.395)
	Abnormal	2.319 (0.932-5.771)
State Anxiety Inventory		1.033 (0.983-1.087)
Trait Anxiety Inventory		1.034 (0.992-1.078)

Enter method used for multivariate analysis.

* OR values were adjusted for age and gender.

online social activities are thought to be the reasons for the higher IGD risk.^{24,48}

Though this study had strengths in terms of its contribution to the literature and originality, it also had some limitations. The inability to collect data from the study population by determining a sampling method was one of the limitations of this cross-sectional study. However, this study may be useful for estimating the level of IGD and for carrying out more comprehensive studies. In this way, IGD can be controlled and healthier gaming behaviors can be developed in the general population.

Conclusion

There are many studies in the literature on the evaluation of game addiction of young people and adults. However, there are not enough studies evaluating IGD with the data obtained from the universe of social network game sites in Turkey.

This study could be critical in terms of evaluating the IGD level of young adults who are members of social network gaming sites, as well as examining the risk factors related to IGD.

With this study, it is possible to evaluate the game behaviors and game addiction status of the members of the social media game groups, which are especially closed groups.

The results of this study will contribute to the efforts of the health authorities in the country to understand and to prevent game addiction concept.

Acknowledgements

The authors gratefully thank all participants and social media managers.

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Conflict of Interests

The authors have no conflict of interest.

Ethics Approval

The ethics committee approval (09.07.2020/37) was obtained from the Social and Human Sciences Ethics Committee of the Ankara Yıldırım Beyazıt University.

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