A Study on Digital Game Addictions of Adolescents in the Covid-19 Pandemic

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Article Info	Abstract
	The concept of digital game addiction has become an important issue that needs to be studied, depending on the increase in the time spent on the internet today, where technology and internet usage times are increasing rapidly. In this context, this study aimed to understand the antecedents of high school students' online game addiction risks. The survey method was used in the study. Within the scope of the research, 559 high school students randomly selected from this population formed the sample of the study. The "Game Addiction Scale for Adolescents," adapted into Turkish by Ilgaz (2015), was used as a data collection tool in the study. The results showed that digital game addictions of high school students were formed at the highest level in the dimensions of mood modifications, tolerance, and salience, respectively. The lowest averages were in the withdrawal and conflict dimensions. These findings show that high school students experience many emotional states in the game at a high level. Besides, while digital game addiction of male students was higher, it was determined that games played via computer caused more digital addiction. While digital game addictions of high school students do not change according to their grade level and academic achievement, their digital game addictions change according to family income level, playing time, and parental education level.

Introduction

Technological developments, changing needs, and sometimes necessities can cause our daily habits to change and a new lifestyle to be formed. Especially during the covid-19 pandemic, a closed life and the formation of an online communication process have brought technological developments and the internet to the important focus of our lives. As a matter of fact, studies conducted in the last ten years show that individuals' technology and internet usage times in daily life have increased rapidly, and the internet has become an important part of our lives (Derbyshire et al., 2013; Young & De Abreu, 2011). The internet is an important tool for individuals to reach rich information content and communicate with others from all over the world (Young & De Abreu, 2011). The emergence of smartphones and easy access to the internet has also significantly increased access to personal technologies (Schmitt & Livingston, 2015). Despite all these developments, this ease of access and social networking process has raised concerns for many individuals, especially adolescents. Especially one of these concerns is internet addiction (Young, 2009). Many applications accessed over the Internet can be addictive to adults and children, and an average adult can spend seven hours a day on the Internet. Due to the increase in the time spent on the Internet, the concept of digital game addiction has become one of the important issues to be studied, especially during the Covid-19 pandemic, and research on its effects on children has become a subject of interest. Especially adolescents show great interest in these games, which are suitable for almost all ages, and the time spent playing games is increasing day by day (Gentile, 2009). When the literature is examined, it is seen that digital game addiction has become a more serious problem with each passing day, and the research on this subject is increasing day by day. In general, the primary purpose of research is to understand addiction, to reveal its causes and consequences (Bhagat et al., 2020).

According to Greenfield (2011), the most addictive aspect of the internet is computer games. Computer games are considered a popular type of activity loved by adolescents to relieve the stress of work or activities made during leisure times (Griffiths, 2005). In addition, changing socioeconomic conditions enable children to access various games more easily (Charoenwanit & Sumneangsanor, 2014). Although these content areas are not limited to the internet, it is known that the addictive potential of the content increases when they are accessed over the internet. Currently, almost every young person can easily access various technological developments, especially in online games, and online game addiction is increasing in adolescents (Rehbein et al., 2015). Adolescents are in the age group sensitive to online game addiction due to features related to the developmental

period (e.g., communication difficulties in interpersonal relationships and the need for self-actualization) (Lafrenière, Vallerand, Donahue, & Lavigne, 2009). The aspects of online gaming addiction that interrupt other daily activities and negatively affect life are among the sensitive issues, especially for adolescents (APA, 2013). According to Young (2009), someone's inability to control the use of online games has many effects on physical and psychological harm to its users. On the one hand, adolescents may find it easier to establish close relationships with others in an imaginary world of games than to communicate directly with them. Therefore, Interactions in the game world can represent a way to solve real interpersonal problems. On the other hand, it can allow adolescents to gain respect and esteem from other players with their gaming skills, thereby satisfying their self-actualization needs. Due to the increase in the time adolescents spend with internet games, it harms the social, occupational, family, school, and psychological functioning of the individual (Gentile et al., 2011; Kuss, 2013). There is limited literature on the risk factors associated with gaming addiction in adolescents. There is not much detailed information other than male dominance depending on gender (Chou & Tsai, 2007; Gentile, 2009; Irles & Gomis, 2016; Padilla-Walker et al., 2010). Therefore, this exploratory study aimed to expand knowledge on potential risk factors for gaming addiction among adolescents.

Online Game Addiction in Adolescents

Technological developments are very rapid in the digital age. Today's adolescents have easy access to technology and are a generation that develops and changes with technology (Oblinger & Oblinger, 2005). One of the technological development products adolescents prefer in the digital age is digital games (Novrialdy & Atyarizal, 2019). Games offer endless and constantly changing experiences, often in a social context, and new games and innovative technologies are constantly entering the consumer market. Many of the new games feature more immersive, socially integrated, and monetized functions than their predecessors (Kuss et al., 2017). However, while gaming provides many benefits, there is a growing recognition that unrestricted screen time can cause harm, especially in young people, and that for some vulnerable people, gaming can be quite time-consuming and addictive (King & Delfabbro, 2020). Games are one of the most comprehensive entertainment activities, regardless of culture, age, and gender, especially since the development of the internet. Computer games that could have been played offline in the past are now compatible with online environments (Bağcı & Albayrak Özer, 2021). Online games are associated with needs such as a sense of achievement, social visibility, and escape (Kuss et al., 2017; Kuss et al., 2012; Wan & Chiou, 2006). When combined with excessive playing times, this situation can lead to a decrease in quality of life (Fuster et al., 2016) and even addiction (Lui et al., 2011; Xu et al., 2012).

The American Psychiatric Association (APA) has defined addiction as "continuing to make maladaptive choices even in the face of a clearly stated different choice" (APA, 2013). Internet addiction is defined as 1) overuse, often associated with a loss of sense of time or neglect of basic impulses; 2) withdrawal with feelings of anger, tension, and/or depression when the computer is not accessible; 3) tolerance with the need for better computer equipment, more software, or more hours of use; and 4) negative reactions with arguments, lying, poor achievement, social isolation, and fatigue (Block, 2008). Lemmens et al. (2012) state that digital game addiction should be examined in the context of seven criteria. These are;

- "salience," making the game the focus of the individual's life,
- "tolerance," the increasing time spent in the game,
- "mood modification," the orientation of the individual to the game to get rid of his troubles,
- "withdrawal," situations such as sudden irritability and irritability during the game,
- "relapse" excessive desire to play and a tendency to play repeatedly,
- "conflict" experiencing conflicts with those around them and displaying negative behaviors such as lying, and
- "problems," having problems in daily life due to excessive gaming.

In particular, there are psychological and utilitarian gains behind the decisions of individuals to continue using technologies (Kim, 2009). In this respect, users may develop distorted beliefs about technology use. Young (2010) states that online games are one of the most addictive activities. Addiction is characterized by the loss of control over online gaming (van Rooij et al., 2011), the increased priority of online gaming over other interests and daily activities (Griffiths et al., 2004; Choi & Kim, 2004) and escaping from the realities of life (Hussain & Griffiths, 2009) and continuing to play online despite negative consequences (Saunders et al., 2017).

Games can have positive aspects such as reducing stress and fatigue improving visual and attention skills (Green & Bavelier, 2003; Griffiths 2005). However, the increasing popularity of online games, along with the

increasing number of reported online gaming addiction cases, lead to some negative effects such as ignoring family responsibilities, neglecting work, health problems and committing crimes (Hsu et al., 2009; King et al., 2018). Griffiths et al. (2004) revealed that young gamers spend more time on online games than adult gamers and form stronger bonds. This shows that young people may be addicted to online games. Online games attract millions of players worldwide who spend a few hours a day. Such games can make users addicted, similar to substance abuse (Kuss et al., 2012). Online gaming addiction is becoming more and more widespread and is increasingly worrisome. In addition, the American Psychiatric Association (2013) explains that online game addiction is the constant and repetitive use of online games, which often leads to disruption of daily life. Young (2009) states that addiction to online games can have enormous consequences for the player. Gaming addicts willingly give up sleep, food, and real human contact to spend more time in the virtual world. Players are constantly alerted in the ever-changing virtual environment. The "just a few more minutes" approach can turn into hours as the game addict aims for the next challenge (Sherry et al., 2006). Game addicts need to play for a long time to gain superiority in the game. Teenagers who are addicted to online games have difficulty forming social relationships with their peers or other individuals. This is because young people spend too much time playing online games, thus reducing their opportunities for building relationships (Young, 2009).

Playing online games can also be done to avoid problems, but it is not a wise choice. Because continuing to avoid problems will not solve the problems (Grizzard et al., 2014). In the study conducted by Chung et al. (2019), approximately 6% of adolescents were categorized as a severely dependent group. Comparisons between groups showed that the addicted group started using the internet earlier than others. They have been reported to have higher levels of depression and aggression, as well as lower family cohesion and higher accessibility to computer cafes, and exposure to internet gaming advertising. It has also been observed that environmental factors have a greater effect on adolescents than family or school-related factors. Wan and Chiou (2006) conducted a qualitative study on why adolescents in Taiwan are addicted to internet games. Most interviewees stated that life without online games was "dark" and "boring." The interviewees stated that playing online games is just a "feeling of relaxation," "leisure time activities," "getting away from the present," "escaping from reality," "relaxing," "feeling like you are still working." In addition, adolescents stated that they see online gaming as the focal point of their lives. Yang and Tung (2007) reported that Taiwanese high school students, who are characterized by shyness, addiction, depression, and low self-esteem, have a higher tendency to become addicted to online games. In the study conducted by Ekinci et al. (2017) with high school students, it was seen that male students' digital game addiction was higher than female students. In addition, it was determined that the digital game addiction level of students who do not do sports is higher than those who do sports. It was concluded that students who have difficulty making use of their spare time also have high levels of digital game addiction. In the study conducted by Gentile et al. (2011), it was reported that depression, anxiety, social phobias, and low school performance are among the consequences of problematic gaming. In particular, most youth (84%) who were initially identified as problem players were still found to be problem players two years later. It has been observed that problematic games can often persist without intervention. In their research, Toker and Baturay (2016) found that socioeconomic status, smoking, playing online games, computer games, and maternal employment increase game addiction; and gender (female) and maternal education level decreased game addiction. They also revealed that game addiction significantly reduced GPA and self-esteem.

Online gaming addiction in adolescents affects various aspects of life such as psychological, health, academic, social, and financial (Billieux et al., 2008; Griffiths et al., 2012; King & Delfabbro, 2018; Lemmens et al., 2011; Novrialdy et al., 2019; Weinstein, 2010). Online gaming is an emotionally tiring and time-consuming activity. In order to create more time for the computer, game addicts avoid sleep, diet, exercise, hobbies, and socialization (Young, 2004; Dworak et al., 2007), family responsibilities, work, and health problems (Batthyány et al., 2009; Hsu et al., 2009; Young, 2009). They may experience some health problems such as back pain, eye strain, and repetitive stress because they do not take the time to get enough rest and nutrition they need (Young, 2009). The dangers that may arise due to addiction to online games include indifference to other activities (Oggins & Sammis, 2012), feeling restless when not playing games (Jannah et al., 2015), loss of control over time, decreased academic achievement, weakening of social relationships, financial and health problems. (Ghuman & Griffiths, 2012). In addition, it can cause many negative physical and psychological harms, such as social isolation, suicide, insomnia, hypertension, and death (Bruner & Bruner, 2006). In addition, a student's use of personal computers, smartphones, and video games is associated with negative psychosocial behaviors that affect student learning (Jeong & Kim, 2011; Heyoung et al., 2014; Schmitt & Livingston, 2015). A lack of understanding of the risks of online gaming addiction can keep adolescents stuck in online gaming addiction (Jeong & Kim, 2011; Novrialdy et al., 2019). According to Papec et al. (2015), one of the most important obstacles to the use of time is digital game addiction. Therefore, online gaming addiction has recently become a topic of increasing research interest. Less understanding of the risks of online gaming addiction may lead individuals to become trapped in online gaming addiction. Future studies can be conducted with more precise

measurements on the identified potential risk factors (Lam et al., 2009). This study aims to understand the antecedents of high school students' online game addiction risks. By understanding the antecedents of this condition, better prevention, screening, and intervention techniques can be developed. This also represents a gap that is intended to contribute to the literature. In this context, answers to the following questions were sought in the study.

    1. What is the digital addiction level of high school students?
    2. Does the digital addiction levels of high school students
        a. vary according to gender characteristics?
        b. vary by grade level?
        c. vary according to family income status?
        d. vary according to academic grade point averages?
        e. vary according to mother's educational status?
        f. vary according to father's educational status?
        g. vary according to the time spent in the game?

Method

The survey method, one of the quantitative research methods, was used in the research. The survey method aims to determine the group's specific characteristics to be researched through a restricted population and to test the hypotheses about the nature of the relationships within this group. In survey studies that aim to describe a past or present situation as it is, a large number of people can be reached, especially in a short time, and the views of the participants can be described by researching on large samples (Fraenkel et al., 2011; Creswell, 2012). Within the scope of this research, high school students were considered a limited population, and their digital addiction levels as a phenomenon were tried to be described in terms of some independent variables. In this process, the personal opinions of high school students were taken through face-to-face applications. This process aims to increase the reliability of the obtained data.

Study Group

The target population of the research is high school students in secondary education institutions affiliated with the Ministry of National Education. The limited population of the research consists of students studying in public high schools in a province located in Central Anatolia in the 2019-2020 academic year. Within the scope of the research, 559 high school students randomly selected from this population formed the sample of the study.

Before determining the study sample, the sample group size was calculated using the Power analysis G Power statistical software (Faul et al. 2007). In this context, the digital game addiction scale was evaluated as the primary outcome parameter, and the target sample size was calculated as 495 was for the effect size (.2), Alpha (.05), and Power (.95) values obtained in previous studies. In addition, to generalize to a population of approximately 5000 people, it is sufficient to reach 357 people with at least .05 significance level and .05 deviation (URL-1). In this direction, 559 high school students in the study sample are sufficient for generalization to the restricted population.

During the data collection process, a total of 636 measurement tools were delivered to high school students, and the opinions of 559 students who were suitable for data entry were included in the scope of the study. The survey response rate was calculated as 87.8%. In order to make a healthy comment, the return rate of the survey is 70-80% (Büyüköztürk et al., 2017). In this context, it can be said that the data obtained within the scope of the study are suitable for making a healthy interpretation. Information about the students included in the study is given in Table 1.

While 237 (42.4%) of the high school students in the study group were female, 322 (57.6%) were male. In addition, 45.1% of the students are in 9th grade, 27.5% are in 10th grade, 18.4% are in 11th grade, and 8.9% are in 12th-grade. While the family income level of approximately 50% of the students in the study group is between 2501-5000 TL, their parents' education level is at the highest rate at the high school level. 241 (43.1%) of the students play for 1-2 hours, 147 (26.3%) of them play daily for 3-4 hours. In addition, the majority of students use mobile phones (n=446; 79.8%) as a means of playing games.

Table 1. Demographic information of high school students in the study group

Independent variables		f	%	Independent variables		f	%
Gender	Female	237	42.4	Educational status of the mothers	Primary	151	27.0
	Male	322	57.6		Secondary	166	29.7
Grade Levels	9. grade	252	45.1		High School	168	30.1
	10. grade	154	27.5		University	74	13.2
	11. grade	103	18.4	Educational status of the fathers	Primary	80	14.3
	12. grade	50	8.9		Secondary	126	22.5
Family income	0-2500 TL	168	30.1		High School	200	35.8
	2501-5000 TL	282	50.4		University	153	27.4
	5001-7500 TL	69	12.3	Time spent in game	1 hour and less	23	4.1
	7500 - + TL	40	7.2		1-2 hours	241	43.1
Academic grade point average	25-54	56	10.0		3-4 hours	147	26.3
	55-69	168	30.1		5-6 hours	83	14.8
	70-84	176	31.5		7 hours and more	65	11.6
	85-100	159	28.4				
Gaming tools	Mobile phone	446	79.8				
	Computer	113	20.2				

Data Collection Tools

"Personal Information Form (PIF)" developed by the researchers and "Game Addiction Scale for Adolescents" adapted into Turkish by Ilgaz (2015) were used as data collection tools in the research. The aim of PIF is to collect data on independent variables (gender, class level, income status, etc.) that are considered to be a factor in students' digital addiction, which is considered as the dependent variable within the scope of the study (Young, 2009; Jeong & Kim, 2011; Irles & Gomis, 2016; Toker & Baturay, 2016; Ekinci et al., 2017; King & Delfabbro, 2018; Novrialdy et al., 2019; Chung et al., 2019). In addition, the "Game Addiction Scale for Adolescents," which was originally developed by Lemmens et al. (2009) and adapted into Turkish by Ilgaz (2015), was used to determine digital game addictions of high school students. It is one of the most cited and widely used scales. This scale is also common in representation compared to other scales.

The scale consists of 21 items and seven factors. The 7 factors and reliability coefficients in the scale are as follows: 1. factor: Salience, $\alpha=.78$; 2nd factor: durability factor, $\alpha=.79$; 3rd factor: mood modification factor, $\alpha=.66$; 4th factor: withdrawal factor, $\alpha=.74$; 5th factor: relapse factor, $\alpha=.85$; 6th factor: conflict factor, $\alpha=.83$; 7th factor: problems factor, $\alpha=.62$. The Cronbach Alpha internal consistency coefficient for the overall scale was calculated as .92. There are three items in each factor. The scoring of the scale is in a 5-point Likert type, and the scorings are "Never (1), Rarely (2), Sometimes (3), Often (4) and Very Often (5)". The internal reliability coefficient of the scale used in the research was recalculated and calculated as .87. These results show that the measurement tool will give reliable results within the scope of the study (Kalaycı, 2010).

In addition, the scores obtained by high school students in the Game Addiction Scale were recalculated by taking into account the Likert interval used by Hazar and Hazar (2017) in determining their digital game addiction levels. The digital game addiction ranges used in the study are as follows: "1-21: Normal group, 22-42: Low-risk group, 43-63: Risky group, 64-84: Addicted group, 85-105:Highly addicted group", and they are converted to discontinuous data format.

Analysis of Data

Both descriptive and relational analyses were used together to analyze the data. Frequency (f), percentage (%), standard deviation (SD) values were used to determine the digital addiction levels of high school students within the scope of descriptive analysis. Before examining the digital addiction levels of high school students according to their demographic information, it was examined whether the data showed a normal distribution.

Table 2. The findings of normal distribution

		Values
Mean		2.2062
Median		2.1429
Mod		2.00
Skewness		.396
Kurtosis		-.628
Kolmogorov-Smirnov	Statistic	.077
	p	.000

When the normal distribution data on digital addiction of high school students in Table 2 are examined, it is seen that the mean, mode, and median values are not close to each other. In addition, the skewness value of the data is ,396, while the kurtosis value is -.628. Kolmogorov-Smirnov value is statistically significant ($p<.05$). The normal distribution is symmetrical, and it is the distribution whose mean-mode-median values are equal to each other. In addition, the insignificance of the Kolmogorov-Smirnov test for studies with a sample size of more than 50 is interpreted as a normal distribution (Kalaycı, 2010). These findings obtained in Table 2 can be interpreted as the data set does not show a normal distribution. In line with all these data obtained, the Mann-Whitney U test was used while examining the digital addiction levels of high school students according to two-pore variables such as gender and game-playing tool. The Kruskal Wallis test was used to examine digital game addictions of students according to more than two porous variables such as grade level and family income level. The z value was used to calculate the effect size (r) for significant differences. If N= the total number of samples, the effect size value can be calculated using the formula $r=z/\sqrt{N}$ (Pallant, 2020). According to Cohen (1988) criteria, it was interpreted as .1=small, .3=medium, .5=large effect size values.

Results

Digital game addictions and distributions of high school students are given in graphic 1.
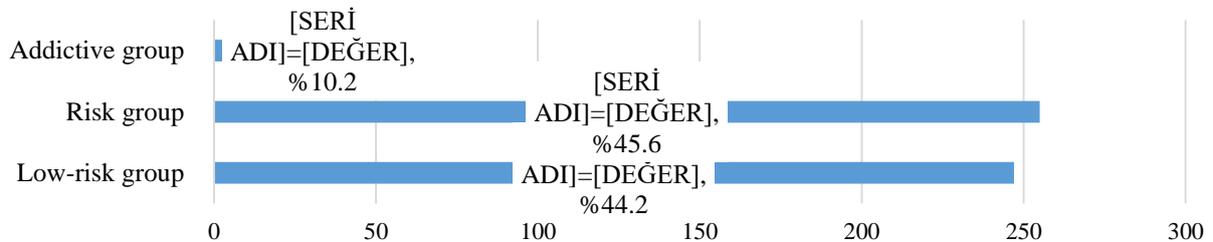
Graphic 1. Digital game addiction levels of high school students

The scores of the high school students in the study sample from the digital game addiction scale were collected under five groups (normal, addicted, low-risk, risky, high-risk) and transformed into a categorical one. According to the data obtained, it was determined that high school students were highest in the risk group (255, 45.6%), low-risk group (247, 44.2%), and addictive group (57, 10.2%), respectively. In addition, it was determined that there were no students in the normal group and at the very risky level.
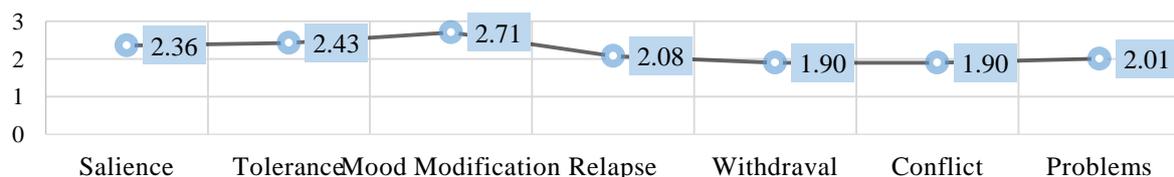
Graphic 2. Digital game addiction levels of high school students in sub-dimensions

When digital game addictions of high school students were examined in the context of the sub-dimensions that make up the game addiction scale for adolescents, the highest level was observed in the dimensions of mood modification ($\bar{x}=2.71$), tolerance ($\bar{x}=2.43$), and salience ($\bar{x}=2.36$), respectively. The lowest averages were in the withdrawal ($\bar{x}=1.9$) and conflict ($\bar{x}=1.9$) dimensions. These findings show that high school students experience many mood states in the game at a high level. They apply to the game to get rid of their troubles, the time spent playing the game is starting to increase, and the gameplay has become an important focus in the lives of the students. In addition, it can be said that high school students rarely experience conflicts with other people

around them due to unpleasant situations such as sudden irritability and anger during the game and excessive playing.

Table 3. Findings related to digital game addiction levels of high school students by gender

	Gender	N	MS	SS	U	Z	p	Effect size (r)
Salience	Female	237	245.18	58108.50	29905.5	-4.403	.000	.186
	Male	322	305.63	98411.50				
Tolerance	Female	237	264.02	62573.50	34370.5	-2.019	.044	.085
	Male	322	291.76	93946.50				
Mood Modification	Female	237	263.48	62445.50	34242.5	-2.085	.037	.088
	Male	322	292.16	94074.50				
Relapse	Female	237	249.02	59017.00	30814.0	-3.925	.000	.166
	Male	322	302.80	97503.00				
Withdraval	Female	237	255.97	60665.50	32462.5	-3.085	.002	.130
	Male	322	297.68	95854.50				
Conflict	Female	237	275.57	65311.00	37108.0	-.563	.573	-
	Male	322	283.26	91209.00				
Problems	Female	237	271.75	64405.50	36202.5	-1.046	.296	-
	Male	322	286.07	92114.50				

In Table 3, when the digital addiction levels of high school students are examined according to their gender characteristics, it is generally seen that males' digital addiction is higher in each dimension. However, the difference in means between groups in (U=29905.5, p=.000, r=.186), tolerance (U=34370.5, p=044, r=.085), change in status (U=34242.5, p=.037, r=.088), relapse (U=30814, p=.000, r=.166) and withdrawal (U=32462.5, p=002, r=.130) dimensions was significant in favor of male students, whereas the means between groups were not statistically significant in conflict (U=37108, p=.573) and problems (U=36202.5, p=.296) dimensions. Significant differences have small effect sizes. These findings obtained shows that the game became the focal point in male student's lives, the time spent playing the game started to increase gradually, they experienced the game as fun, they could experience sudden moodiness and irritability during the game, and they could not control their desire to play excessively and started playing games again and again.

Table 4. Findings related to digital game addiction levels of high school students by game playing tools

	Game Playing Tool	N	MS	SS	U	Z	p	Effect Size (r)
Salience	Mobile Phone	446	269.80	120329.50	20648.5	-2.988	.003	.126
	Computer	113	320.27	36190.50				
Tolerance	Mobile Phone	446	268.20	119618.50	19937.5	-3.452	.001	.146
	Computer	113	326.56	36901.50				
Mood Modification	Mobile Phone	446	266.78	118985.50	19304.5	-3.864	.000	.163
	Computer	113	332.16	37534.50				
Relapse	Mobile Phone	446	273.21	121852.50	22171.5	-1.992	.046	.084
	Computer	113	306.79	34667.50				
Withdraval	Mobile Phone	446	272.08	121346.50	21665.5	-2.356	.018	.099
	Computer	113	311.27	35173.50				
Conflict	Mobile Phone	446	272.41	121493.50	21812.5	-2.237	.025	.094
	Computer	113	309.97	35026.50				
Problems	Mobile Phone	446	270.99	120860.00	21179.0	-2.647	.008	.111
	Computer	113	315.58	35660.00				

When digital addiction is examined in terms of gaming tools, it has been determined that students who play games with computers are generally more addicted than students who play mobile phones. The difference between the mean rank in each dimension differs in favor of the students playing games with the computer. These findings show that especially games played via computer cause more digital addiction. It can be said that students who play games with the computer focus on the game more, the time spent on the game is getting more and more, the game becomes more fun, and they embrace playing games more, the unwanted psychological and physiological situations increase during the game, they experience conflict with the individuals around them, and they started to have problems in areas of responsibility such as school as a result of excessive gaming behavior.

Table 5. Findings related to digital game addiction levels of high school students by grade levels

	Grade Levels	N	MS	χ^2	df	p
Salience	[1]9.grade	252	279.98	1.765	3	.623
	[2]10.grade	154	285.48			
	[3]11.grade	103	285.22			
	[4]12.grade	50	252.44			
Tolerance	[1]9.grade	252	275.20	.423	3	.935
	[2]10.grade	154	283.50			
	[3]11.grade	103	283.44			
	[4]12.grade	50	286.32			
Mood Modification	[1]9.grade	252	282.17	2.620	3	.454
	[2]10.grade	154	264.15			
	[3]11.grade	103	296.06			
	[4]12.grade	50	284.81			
Relapse	[1]9.grade	252	284.71	.642	3	.887
	[2]10.grade	154	274.48			
	[3]11.grade	103	281.94			
	[4]12.grade	50	269.25			
Withdraval	[1]9.grade	252	282.38	.529	3	.913
	[2]10.grade	154	277.42			
	[3]11.grade	103	284.45			
	[4]12.grade	50	266.81			
Conflict	[1]9.grade	252	279.73	3.802	3	.284
	[2]10.grade	154	263.32			
	[3]11.grade	103	302.39			
	[4]12.grade	50	286.63			
Problems	[1]9.grade	252	277.05	,769	3	,857
	[2]10.grade	154	280.28			
	[3]11.grade	103	277.86			
	[4]12.grade	50	298.44			

Table 6. Findings related to digital game addiction levels of high school students by family income

	Family income	N	MS	χ^2	df	p	The source of the difference, Effect Size (r)
Salience	[1]0-2500 TL	168	260.13	8.116	3	.044	3>1, r=.189
	[2]2501-5000 TL	282	281.18				
	[3]5001-7500 TL	69	325.32				
	[4]7500 and above TL	40	276.95				
Tolerance	[1]0-2500 TL	168	262.61	10.252	3	.017	3>1, r=.188
	[2]2501-5000 TL	282	273.89				
	[3]5001-7500 TL	69	327.72				
	[4]7500 and above TL	40	313.81				
Mood Modification	[1]0-2500 TL	168	263.49	7.614	3	.055	
	[2]2501-5000 TL	282	275.76				
	[3]5001-7500 TL	69	314.02				
	[4]7500 and above TL	40	320.55				
Relapse	[1]0-2500 TL	168	267.15	7.124	3	.068	
	[2]2501-5000 TL	282	276.12				
	[3]5001-7500 TL	69	326.72				
	[4]7500 and above TL	40	280.68				
Withdraval	[1]0-2500 TL	168	285.01	2.725	3	.436	
	[2]2501-5000 TL	282	271.80				
	[3]5001-7500 TL	69	281.99				
	[4]7500 and above TL	40	313.38				
Conflict	[1]0-2500 TL	168	266.04	6.359	3	.095	
	[2]2501-5000 TL	282	275.61				
	[3]5001-7500 TL	69	307.36				
	[4]7500 and above TL	40	322.40				
Problems	[1]0-2500 TL	168	271.83	1.402	3	.705	

	N	MS
[2]2501-5000 TL	282	279.41
[3]5001-7500 TL	69	297.99
[4]7500 and above TL	40	287.46

Digital game addiction levels of high school students do not change significantly in each dimension according to their grade levels. In particular, this finding shows that students' grade levels are not a factor influencing their digital addiction. The digital addiction levels of the students in each class are equal to each other.

When Table 6 is examined, it is seen that the highest rank average of high school students' digital addiction levels according to their family income status is seen in the children of families with an income of 5001-7500 TL and 7500 TL and above, while it is seen that it occurs lowest in children with a family income of 0-2500 TL. In terms of salience and tolerance, the difference between the mean rank of the groups was in favor of the income of 5001-7500 TL families among families with an income of 5001-7500 TL and families with an income of 0-2500 TL. These significant differences have a small effect size. These findings show that the family income level is an effective variable on digital addictions, especially in the salience and tolerance dimensions of high school students, and show that children's digital addictions increase with the increase in the family's income level. It can be interpreted that play has become the most important focus in life, especially for children from families with high incomes, and the frequency of children's playing and the time spent playing games are starting to increase.

Table 7. Findings related to digital game addiction levels of high school students by academic grade point average

	Academic grade point average	N	MS	χ^2	df	p	The source of the difference, Effect Size (r)
Salience	[2]25-54	56	269.07	5.869	3	.118	
	[3]55-69	168	297.23				
	[4]70-84	176	287.78				
	[5]85-100	159	257.04				
Tolerance	[2]25-54	56	256.83	2.123	3	.547	
	[3]55-69	168	287.01				
	[4]70-84	176	287.00				
	[5]85-100	159	273.01				
Mood Modification	[2]25-54	56	280.71	.592	3	.898	
	[3]55-69	168	273.14				
	[4]70-84	176	280.19				
	[5]85-100	159	286.79				
Relapse	[2]25-54	56	276.29	4.874	3	.181	
	[3]55-69	168	297.26				
	[4]70-84	176	283.87				
	[5]85-100	159	258.79				
Withdraval	[2]25-54	56	301.44	9.331	3	025	3>4, r=.108
	[3]55-69	168	305.04				3>5, r=.157
	[4]70-84	176	270.11				
	[5]85-100	159	256.94				
Conflict	[2]25-54	56	263.42	1.624	3	.654	
	[3]55-69	168	277.34				
	[4]70-84	176	291.28				
	[5]85-100	159	276.17				
Problems	[2]25-54	56	310.87	2.380	3	.497	
	[3]55-69	168	279.08				
	[4]70-84	176	275.50				
	[5]85-100	159	275.08				

When the digital game addiction levels of high school students were examined according to their academic success grades, it was determined that the digital game addiction levels of the students did not change according to their academic success grades. However, students with an academic grade point average (GPA) of 25-54 ($\bar{x}$ =301.44, n=56) and 55-69 ($\bar{x}$ =305.04, n=168) in the withdrawal dimension have high levels of digital addiction. The means between groups were statistically significant (χ^2=9.331, p=.025, r=.108, r=.157). The significant difference was in favor of students with a grade point average of 55-69 between students with a grade point

average of 55-69 and students with a grade point average of 70-84 and 85-100. These significant differences have a small effect size. Although the findings show that the students' academic GPA does not affect their digital addiction in general, it is seen that students with a low GPA in the withdrawal sub-dimension have digital game addiction. This shows that students with low-grade point averages exhibit unpleasant situations such as sudden irritability and anger during the game.

Table 8. Findings related to digital game addiction levels of high school students by time spent in gaming

	Time spent in the game	N	MS	χ^2	df	p	The source of the difference
Salience	1 1 hour and less	23	160.87	52.051	4	.000	3,4,5>2,1
	2 1-2 hours	241	242.82				2>1
	3 3-4 hours	147	293.01				4>3
	4 5-6 hours	83	352.48				
	5 7 hours and more	65	338.03				
Tolerance	1 1 hour and less	23	204.72	31.938	4	.000	3,4,5>2,1
	2 1-2 hours	241	246.86				
	3 3-4 hours	147	293.77				
	4 5-6 hours	83	332.13				
	5 7 hours and more	65	331.82				
Mood Modification	1 1 hour and less	23	225.78	10.684	4	.030	3,4,5>2,1
	2 1-2 hours	241	261.68				
	3 3-4 hours	147	293.85				
	4 5-6 hours	83	297.17				
	5 7 hours and more	65	313.86				
Relapse	1 1 hour and less	23	191.96	32.757	4	.000	3,4,5>2,1
	2 1-2 hours	241	247.46				
	3 3-4 hours	147	297.38				
	4 5-6 hours	83	330.90				
	5 7 hours and more	65	327.50				
Withdraval	1 1 hour and less	23	240.65	31.626	4	.000	3,4,5>2,1
	2 1-2 hours	241	245.28				4,5>3
	3 3-4 hours	147	287.39				
	4 5-6 hours	83	331.75				
	5 7 hours and more	65	339.85				
Conflict	1 1 hour and less	23	240.50	27.475	4	.000	3,4,5>2,1
	2 1-2 hours	241	248.65				5>3
	3 3-4 hours	147	285.42				
	4 5-6 hours	83	320.45				
	5 7 hours and more	65	346.31				
Sorunlar (Problems)	1 1 hour and less	23	230.43	19.813	4	.001	4,5>2,1
	2 1-2 hours	241	258.68				4,5>3
	3 3-4 hours	147	275.78				
	4 5-6 hours	83	317.16				
	5 7 hours and more	65	338.67				

It is seen that the digital game addiction levels of high school students generally occur in children who play games for more than 7 hours and 5-6 hours a day at the highest level in each dimension. The mean difference between the groups, on the other hand, is significant in favor of students who play games for more than 7 hours and 5-6 hours in general. These findings show that their digital game addictions also increase, especially with the increase in the duration of the students' playing games.

In Table 9, it is seen that the highest digital addiction averages according to the educational status of the mothers generally occur in the children of mothers who are high school and university graduates. It was determined that there was a significant difference, especially in the dimensions of mood modification (χ^2=9.739, p=.021) and relapse (χ^2=13.993, p=003). This finding shows that the mother's education level is a factor in the digital game addiction of their children, and as the education level of the mother increases, the digital game addiction of the children increases. In addition, it can be said that high school and university graduate mothers' children see the game as a means of entertainment to get rid of their problems, and they cannot control the excessive playing behavior and turn to the behavior of playing games again.

Table 9. Findings related to digital game addiction levels of high school students by mother's educational status

	Mother's education status	N	MS	χ^2	df	p	The source of the difference, Effect Size (r)
Salience	[1] Primary	151	263.72	3.015	3	.389	
	[2] Secondary	166	287.33				
	[3] High school	168	278.76				
	[4] University	74	299.58				
Tolerance	[1] Primary	151	259.87	4.728	3	.193	
	[2] Secondary	166	276.15				
	[3] High school	168	297.25				
	[4] University	74	290.55				
Mood Modification	[1] Primary	151	252.92	9.739	3	.021	3>1, r=.133
	[2] Secondary	166	273.34				4>1, r=.181
	[3] High school	168	295.17				
	[4] University	74	315.76				
Relapse	[1] Primary	151	241.89	13.993	3	.003	2>1, r=.136
	[2] Secondary	166	285.60				3>1, r=.207
	[3] High school	168	308.26				
	[4] University	74	281.05				
Withdrawal	[1] Primary	151	257.54	4.212	3	.240	
	[2] Secondary	166	287.18				
	[3] High school	168	289.89				
	[4] University	74	287.28				
Conflict	[1] Primary	151	260.11	4.888	3	.180	
	[2] Secondary	166	275.63				
	[3] High school	168	298.07				
	[4] University	74	289.36				
Problems	[1] Primary	151	269.70	4.802	3	.187	
	[2] Secondary	166	264.98				
	[3] High school	168	295.02				
	[4] University	74	300.63				

Table 10. Findings related to digital game addiction levels of high school students by father educational status

	Father's education status	N	MS	χ^2	df	p	The source of the difference, Effect Size (r)
Salience	[1] Primary	80	266.09	1.182	3	.757	
	[2] Secondary	126	274.30				
	[3] High school	200	283.47				
	[4] University	153	287.43				
Tolerance	[1] Primary	80	276.96	1.305	3	.728	
	[2] Secondary	126	267.83				
	[3] High school	200	281.66				
	[4] University	153	289.45				
Mood Modification	[1] Primary	80	258.09	13.668	3	.003	4>1, r=.134
	[2] Secondary	126	241.70				4>2, r=.191
	[3] High school	200	294.76				3>2, r=.161
	[4] University	153	303.71				
Relapse	[1] Primary	80	255.96	2.145	3	.543	
	[2] Secondary	126	282.04				
	[3] High school	200	283.84				
	[4] University	153	285.87				
Withdrawal	[1] Primary	80	296.92	1.894	3	.595	
	[2] Secondary	126	267.13				
	[3] High school	200	278.09				
	[4] University	153	284.25				
Conflict	[1] Primary	80	284.21	.210	3	.976	
	[2] Secondary	126	274.66				
	[3] High school	200	280.91				
	[4] University	153	281.00				

	[1] Primary	80	285.83	2.079	3	.556
Problems	[2] Secondary	126	270.16			
	[3] High school	200	273.29			
	[4] University	153	293.83			

In Table 10, when digital game addictions of high school students were examined in terms of father's education level, there was a significant difference only in the mood modification sub-dimension (χ^2=13.668, p=.003). The significant differences that occurred had a small effect size (r=.134, r=.191, r=.161). It is seen that the mean between the groups is significant between the children of fathers who are high school and university graduates and the children of fathers who are primary and secondary school graduates, in favor of the first group. This shows that with the increase in fathers' education level, their children start to see games as fun, and they turn to digital games to get rid of their troubles.

Conclusion and Discussion

High school students were gathered under three groups when digital game addictions were grouped. These are; risky group, low-risk group, and addictive group, respectively. About 10% of the students in the study group are addicted to digital games. In addition, most of the high school students (45.6%) are in the risky group. Among the students in the study sample, students in the normal group and the high-risk group were not detected. These results show that digital games have a high risk of addiction for students in high school. In the study conducted by Chung, Lee, and Lee (2019), approximately 6% of adolescents were categorized as a severely addictive group. Comparisons between groups showed that the addicted group started using the internet earlier than others.

When it is examined in the context of the subgroups that make up the scale, digital game addictions of high school students were found at the highest level in the dimensions of mood modification, tolerance, and salience. The lowest averages are in the withdrawal and conflict dimensions. These results show that high school students experience many emotional states in the game at a high level. They resort to the game to get rid of their troubles, the time spent playing the game has started to increase, and the gameplay has become an important focus in the students' lives. In particular, this situation may cause high school students to have anxiety and worry in their thoughts later on and may cause more desire to overuse games. In addition, it can be said that high school students rarely experience conflicts with other people around them due to unpleasant situations such as sudden irritability and anger during the game and excessive playing. Educations for the conscious use of technology can be brought to the fore in preventing students' online game addiction. The education designed in the middle of formal learning can provide a good cognition development for individuals to understand the dangers of online gaming addiction. Moreover, education can encourage rational thinking to reduce overuse, preventing addiction (Faggiano, Vigna-Taglianti, Versino, Zambon, Borraccino, & Lemma, 2008). As a matter of fact, the study by Kweon and Kim (2014) showed that adolescents with a high satisfactory school life are less likely to develop an online gaming addiction. He argued that school norms strong relationships with peers and teachers could be defined as protective factors against game addiction among adolescents.

In general, male students have higher levels of digital addiction than female students. It was determined that the mean of male students was higher, especially in the dimensions of salience, tolerance, mood modification, relapse, and withdrawal. Similarly, in many studies, it has been found that gender is an important factor in game addiction, and males have higher levels of addiction (Bonanno & Kommers 2005; Charlton & Danforth, 2007; Chiu, Lee, & Huang, 2004; Chou & Tsai, 2007; Ekinci, Yalçın, & Soyer, 2017; Griffiths et al., 2004; Lee, Han, Kim, & Renshaw, 2013; Walther, Morgenstern, & Hanewinkel, 2012). These results show that the game became the focal point in male students' lives, the time spent playing the game started to increase gradually, they experienced the game as fun, they could experience sudden moodiness and irritability during the game, and they could not control their desire to play excessively and started playing games again and again. According to Charlton and Danforth (2007), male adolescents are more likely to play video games excessively and are more likely to encounter negative consequences due to their gaming behaviors. In addition, males have a 2-3 times higher risk for internet addiction than females (Lee et al., 2013). In this respect, it has been found that gender is an important factor in digital addiction, and male adolescents' propensity for excessive gaming and problematic use is higher than that of adolescent females and other age groups (Irmak & Erdoğan, 2016). This is because males are more game-oriented, and females are more conversation-oriented (Mitchell, 2000). In addition, according to Winn and Heeter (2009), girls report that they spend less free time, and this free time is divided into shorter periods, which makes it difficult to allocate more time to video games. Despite these results, there are studies in the literature showing that gender is an important variable on its own, but when other variables

interact with gender and when race, age, and grade point averages are included, gender is not a significant predictor variable (Reason, 2001). Moreover, study findings show no difference between male and female students in terms of internet activities such as gaming, downloading, gambling, and shopping (Rehbein & Mößle, 2013).

According to the game-playing tools, it was determined that most high school students prefer phones. However, when the addiction levels were examined, it was determined that the students who played games with the computer were more addicted than the students who played games with the mobile phone. This shows that computer use, in particular, carries a greater risk for digital game addiction. It can be said that these results show that high school students focus more on the game with the computer, the time spent on the game is increasing, the game becomes more fun, and they are more connected to the game, the undesired psychological and physiological states increase during the game, the interaction with the individuals around them increases, they experience conflicts, and they start to have problems in areas of responsibility such as school as a result of excessive playing behavior. Similar results were obtained in the literature (Bruner & Bruner, 2006; Gentile et al., 2011; Papec et al., 2015; Young, 2004).

Digital game addiction levels of students do not change according to grade levels. This result shows that the digital addiction levels of students studying at different grade levels are equal to each other. Similarly, there are studies in the literature showing that students' digital game addictions do not change according to grade levels (Ayhan & Köseliören, 2019; Bağci & Albayrak-Özer, 2021; Koç & Uğur, 2017; Kurt, Dogan, Erdogmus, & Emiroglu, 2018). Despite these results, in the study conducted by Koç, Boduroğlu, Ekinay, and Gezici (2021), it was found that the fifth graders had higher game addiction levels than the seventh and eighth graders and the eleventh graders higher game addiction levels than the eighth graders. The study conducted by Öncel and Tekin (2015) determined that the game addiction levels of the eighth-grade students were higher than the fifth and sixth-grade students.

Family income is an important variable for high school students' digital addiction. Within the scope of the research, it was determined that the digital addiction of the students increased with the increase in the family income level. Especially the family's income level is the factor in the salience and tolerance of high school students' digital game addiction. This shows that online play has become an important focus for children from families with high incomes, and the frequency of playing games and the time spent playing games are increasing. Similarly, Toker and Baturay (2016) revealed in their research that socioeconomic status increases addiction. The source of this result can be shown as the ability of families to reach technological opportunities due to the increase in their economic level. The increase in the time that students with technological opportunities spend on the use of technology can be interpreted as a factor that offers opportunities for addiction. In addition, the weakening of the bond with the students' families who have access to technological opportunities can be interpreted as a factor supporting addiction. Because the parent-child relationship strongly affects both internet and game addiction (Parker, & Benson, 2004). A good relationship reduces the degree of addiction (Liu & Kuo, 2007).

Although high school students' digital game addiction levels do not generally change according to their academic success, digital addictions of students with an academic grade point average of 25-54 and 55-69 in the withdrawal dimension are significantly higher. This shows that students with low-grade point averages exhibit unpleasant situations such as sudden irritability and anger during the game. Similarly, many studies (Gentile, Lynch, Linder, & Walsh, 2004; Schmitt & Livingston, 2015; Young, 1996, 1998) stated that there is a negative relationship between academic achievement and the total time spent on video games. Adolescents exposed to more significant amounts of video games perform worse in school (Gentile et al., 2011). Students with low-grade point averages are more likely to show a higher degree of game addiction than those with better grades (Young, 1998). Borzekowski and Robinson (2005) and Mysirlaki and Paraskeva (2007) found no significant relationship between the time devoted to digital gaming and academic performance.

As high school students' playing time increases, their level of digital addiction also increases. In particular, the highest addiction was observed in students who played games for over 7 hours and 5-6 hours, while the lowest was in students who played games for 1 hour or less. Similarly, Lemmens et al. (2009) determined that there is a strong positive correlation between students' game addiction and the time spent on games. In their research, Toker and Baturay (2016) determined that the duration of playing games and computer games increased the addiction levels of students. Essentially, gaming time is already one of the indicators of digital gaming addiction. In general, the concepts of "excessive gaming behavior" and "addiction" can be used interchangeably in the literature (Şimşek, & Karakuş Yılmaz, 2020). However, while playing excessive games can be designed to be fun in a way that does not cause negative consequences in the life of the individual, negative effects may

occur in many areas of daily life due to excessive use of individuals with addiction (Weinstein 2010; Kuss & Griffiths, 2012; Şimşek, & Karakuş Yılmaz, 2020). In the context of this study, it was determined that especially the time spent in the game increased the levels of digital addiction in adolescents, and it could cause negative effects such as the inability to control moods such as moodiness and anger, the increasing time spent playing games, the focus on games, the inability to live in harmony with the real world, and having conflicts. In particular, this situation shows in some studies that with the increase in the time spent in the game, adolescents can choose to meet the need for superiority and socialization in the virtual world as an alternative to their deficiencies in some aspects of the real world (Blais, Craig, Pepler, & Connolly, 2008; Young, 2010). Adolescents with strong psychological needs to master the operation of a game will spend more time playing online games. The same is true for those who have a strong need to relate and escape from reality through online games (Lin, 2010). In addition, the longer the online game playing time and the higher the addiction level, the stronger the deterrents and restrictions will be (Xu et al., 2012).

Mother's education level is an influential variable on digital game addictions of high school students. Especially the children of mothers who graduated from high school and the university had the highest digital game addiction. In addition, as the education level of the mother increases, the digital game addiction of the children also increases. In particular, it was determined that there was a significant difference in mood modification and relapse dimensions. Again, the highest averages in these dimensions belong to the children of high school and university graduate mothers. According to these results, it can be said that especially high school and university graduate mothers,' children see the game as a means of entertainment to get rid of their problems, and they cannot control the excessive playing behavior and turn to the behavior of playing games again. In the nature of this result, the mother may be working due to the increase in the mother's education level. It can be indirectly concluded that the time allocated to children by working mothers is limited. The limited-time devoted to children can be interpreted as weakening family communication. Toker and Baturay (2016) emphasized in their research that maternal employment increases game addiction. In studies (Kim, 2016; Ko, Wang, Liu, Yen, Chen, & Yen, 2015; Zhu, Zhang, Yu, & Bao, 2015), the function of the family (family economy, family health; communication, love) in-game addiction was emphasized. Zhu et al. (2015) found that a low-quality parent-child relationship predicted adolescent online gaming addiction and was also linked to decreased school engagement and increased engagement with deviant peers. Despite these results, there are study findings in the literature showing that the levels of game or internet addiction in adolescents do not differ according to the education level of the mother, and there is no relationship between the education level of the mother and the violence problems arising from video games (Batıgün & Kılıç, 2011; Funk, Baldacci, Pasold and Baumgardner, 2004). However, in a limited number of studies conducted with Turkish students, a negative relationship was found between mother's education level and game addiction (Çakıcı, 2018; Göymen, 2019; Toker & Baturay, 2016). In these studies, it was found that game addiction decreased as the mother's education level increased in high school students.

In general, while the father's educational status in each dimension was not a factor in the digital game addictions of high school students, the highest averages in mood modification occurred in the children of fathers who were high school and university graduates. This shows that with the increase in fathers' education level, their children start to see games as fun, and they turn to digital games to get rid of their troubles. Similarly, although some studies emphasize that there is no significant relationship between father's education level and game addiction in high school students (Çakıcı, 2018; Göymen, 2019), studies are showing that game addiction is related to father's education level (Eni, 2017). However, studies revealing the relationship between parental education level and game addiction are limited and inconsistent.

Recommendations

A lack of knowledge and understanding of the dangers of online games can cause students to become addicted. Therefore, it is crucial that efforts are made to increase students' knowledge of the dangers of online gaming addiction, particularly by their school, teachers, and friends. School-supported education, seminars, guidance, and counseling can help students understand the dangers of online gaming addiction to avoid addiction to online games because one of the functions of guidance and counseling services in schools is to prevent students' inappropriate behavior.

By strengthening the bond of high school students with school, preventive measures can be taken to prevent game addiction. Schools have a great place in the socialization of children. Establishing stronger student-teacher relationships in schools will lead to fewer behavioral problems (Crosnoe, Johnson, & Elder, 2004). Therefore, the relationship between adolescents and their teachers can be related to the degree of adolescents' game

addiction. In addition, undesirable behaviors exhibited by students in schools will negatively affect students' learning outcomes and academic success (APA, 2013; Bruner & Bruner, 2006; Schmitt & Livingston, 2015). With this prevention strategy, problems such as sleep problems, social conflicts, academic success problems, negative moods, and social isolation can be prevented by reducing the level of play of the students (King & Delfabbro, 2018).

At school, modules on the risks of online gaming addiction can be prepared by student counselors and/or guidance services. Modules can be planned with different content for males and females, especially in the context of gender. Because in the study, it was determined that male students were more prone to addiction. These modules can raise students' awareness of technology use by providing a systematically designed set of learning experiences in a formal setting. It will be important to create this awareness, especially considering that the computer has a greater effect on creating game addiction. Another potential risk in adolescent gaming addiction is parents' education level, family income status, and attitudes towards gaming. The relationship between parents' attitudes towards playing and their adolescent children's play behaviors can be examined in future studies. In addition, parents can be made aware of addiction and technology use, especially as an important stakeholder in the education process.

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