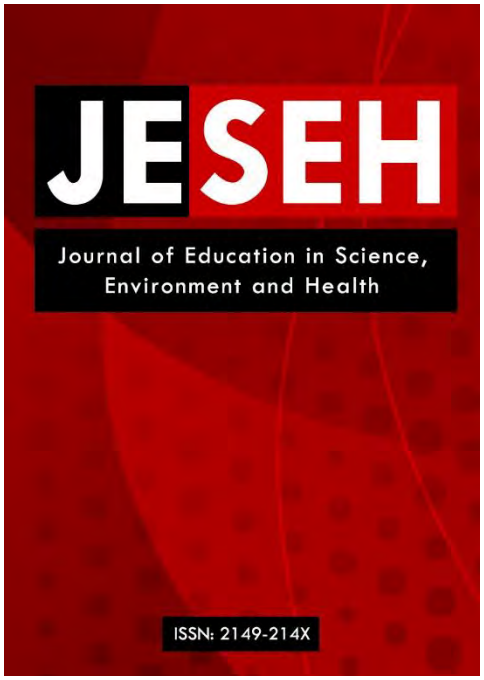

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An Investigation of Secondary School Students' Motivation and Addiction towards Digital Gaming by Age, Gender and Number of Siblings

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Abstract

The aim of this study was to examine the effects of gender, the number of siblings, and grade level on digital game playing motivation and addiction levels in secondary school students and to reveal the relationship between digital game motivation and addiction. A total of 394 students, 168 boys and 226 girls, participated in the study voluntarily. Personal Information Form, Digital Game Playing Motivation Scale, and Digital Play Addiction Scale for Children were used as data collection tools. Digital game playing situation (yes/no) was associated with gender and number of siblings ($p < .05$) but not with grade level ($p > .05$). The motivation and addiction levels for playing digital games are related to gender and grade level ($p < .05$) but not to the number of siblings ($p > .05$). There is a positive relationship between motivation and addiction to playing digital games ($p < .05$). In light of these findings, more effort should be made to prevent digital addiction in males according to gender and in 8th graders according to grade level.

Introduction

Self-determination theory (Deci & Ryan, 1985) and social cognitive theory (Bandura, 1989) are among the theories examined to understand player motivation and experience. Based on the theory of self-determination, digital gaming is an intrinsically enjoyable experience and is explained by the need for autonomy, competence, and relatedness (Tamborini et al., 2010). Social cognitive theory has also been used while trying to explain play behavior in terms of enjoyment, merge of action and awareness, concentration, self-reactive outcome, habit strength, deficient self-regulation, and optimal balance (Lee & LaRose, 2007). Six key motivational themes for digital gaming can be identified; immersion and flow, gratification and affect, escapism, social interaction, identification, and goal orientation (Cheah et al., 2022). Five main characteristics of each player trait can be expressed; Aesthetic orientation (enjoying aesthetic experiences in games, such as exploring the world, enjoying the scenery, or appreciating the quality of graphics, sound, and art style), narrative orientation (enjoying complex narratives and stories within the game), goal orientation (enjoying completing game goals, exploring all options and completing all collections), social orientation (preferring to play with others), and challenge orientation (usually preferring difficult games and hard challenges) (Tondello et al., 2019).

Gaming disorder is characterized by a pattern of persistent or recurrent gaming behavior, which may be online or offline, manifested by: impaired control over gaming; increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities; and continuation or escalation of gaming despite the occurrence of negative consequences (World Health Organization, 2022). Health responsibility, nutrition, interpersonal relationships, and stress management levels of adolescents addicted to digital games are lower than those not addicted to digital games (Aksoy & Erol, 2021).

Emotional eating refers to overeating due to negative emotions such as depression, fear, anxiety or stress, and digital game addiction is an important determinant of emotional eating (Caner & Evgin, 2021). As a result of increased negative emotions due to addiction, eating patterns are disrupted and excessive consumption of food leads to many health problems. Digital game addiction has a negative relationship with cyberbullying sensibility and a positive relationship with internet addiction, and adolescents with major depressive disorder have a higher digital game addiction than healthy adolescents (Uçar et al., 2020). While digital game addiction increases, cyberbullying sensibility decreases and internet addiction increases. Digital game addiction negatively and significantly predicts social connectedness (Savci & Aysan, 2017) and emotional intelligence (Tetik & Aktan, 2021) levels. Interpersonal disability, the need for online social interaction, and self-regulation (control) are important in predicting game addiction (Bhagat et al., 2020). Long-term phone and computer use for playing games in secondary school children increased their neck pain, and those who scored high on the game addiction

scale had wrist, back, and low back pain (Cankurtaran et al., 2022). Digital game addiction levels of students who do sports are low (Ekinci et al., 2017). Students with low academic achievement have higher gaming addiction levels than students with high academic achievement (Özturk Eyimaya et al., 2020). There is a negative relationship between students' grade point average and the number of hours they spend playing online games per day, so students who play video games have lower academic performance (Naaj & Nachouki, 2021). Students with a low academic average have higher game addiction levels than those with a high average (Ekşi et al., 2020). Among the positive effects and results of the games; knowledge acquisition, perceptual and cognitive, affective, behavior change, physiological, skill, soft and social skills are included (Boyle et al., 2016). Personal computer-based, virtual and augmented reality-based, web application-based, Kinect console-based, Nintendo console-based, mobile application-based, and multi-platform-based games positively affect attention rehabilitation (Shahmoradi et al., 2022).

With the development of technology, the concept of digital games that can be accessed with technological devices such as computers, phones, tablets and game consoles has emerged. The interest in digital games is affected by many factors. The concept of motivation can be expressed as the individual's willingness to be ready for behavior. The uncontrollable increase in the duration of digital game playing reveals the concept of addiction, reaching a level that causes physical, social and psychological problems for individuals. Various demographic factors can influence individuals' digital game use and addiction tendency. In the literature, there are studies in which sociodemographic factors such as gender and age are addressed in terms of Motivation and Addiction Towards Digital Gaming (Aksoy, & Erol, 2021; Ekinci et al., 2017; Kaya, & Pazarcıkcı, 2023; Kesici, 2020).

Understanding the role of factors such as gender, age, and number of siblings in this process provides more in-depth information about individuals' digital game use, emphasizing the importance of individual differences and diversity. Investigating the effect of demographic factors such as gender, age, and number of siblings on digital game addiction and motivation can increase the awareness of both individuals and society about digital game use and contribute to the development of healthier usage habits. In this context, our research problem is as follows: "What is the effect of demographic factors (gender, number of siblings, and class level) on digital game motivation and addiction in secondary school students, and is there a relationship between digital game motivation and addiction?". According to the research question, this study aimed to examine the effects of gender, the number of siblings, and grade level on motivation and addiction towards digital gaming and the relationship between digital gaming motivation and addiction. The following four hypotheses were created and tested for the research, and the results were discussed using the current literature.

H_{01}: Gender has no effect on motivation and addiction to digital gaming.
H_{02}: The number of siblings has no effect on motivation and addiction to digital gaming.
H_{03}: Grade level has no effect on motivation and addiction to digital gaming.
H_{04}: There is no relationship between motivation and addiction to digital gaming.

Method

Participants

The research was carried out with 5th, 6th, 7th, and 8th grade students in three different secondary schools (Kırşehir, Türkiye). Three schools in Kırşehir province were randomly selected, but no sample selection was made among the students in the schools; everyone who volunteered was included in the study. A total of 394 volunteer students, 168 boys and 226 girls, participated in the study. The research was carried out in accordance with the Declaration of Helsinki. Both participants and parents were informed about the study and signed a consent form. The research was approved by the Sinop University Human Research Ethics Committee (Reference no: 09.07.2021/2021-102).

Data Collection Tools

Personal Information Form, Digital Game Playing Motivation Scale (DGPMS), and Digital Play Addiction Scale for Children (DGASFC) are data collection tools. The data collection tool was created in the Google form platform and shared with the student's class groups through the Education Information Network (known as EBA in Turkish). EBA is an online educational platform the Turkish Ministry of National Education uses for all

students. The data collection period is two weeks. The research was carried out on the internet in accordance with the precautions during the epidemic process, so the contact was minimized.

Personal Information Form

The personal information form includes questions about students' age, gender, number of siblings, grade level, electronic devices they own, and digital game playing. The last question of the personal information form is "The games played with electronic devices such as a smartphone, tablet, computer, or game console are called Digital Games. Do you play digital games?" is in the form. First of all, the definition of the digital game was made so that mistakes that may arise from misconceptions were tried to be prevented, then the students who answered yes moved on to the next step, the scale questions. Students who answered "No" to the question "Do you play digital games?" did not proceed to the next stage of the scale questions due to the restriction in the online form. Those who answered no to the question did not fill out the scale questions.

Digital Game Playing Motivation Scale

The Digital Game Playing Motivation Scale (DGPMS) developed by Tekkurşun Demir & Hazar (2018), was used in the research. The scale consisted of 19 questions, and a five-point Likert-type rating was used. The first 14 items of the scale were scored normally, while the 15th, 16th, 17th, 18th, and 19th items were reverse scored. The scale has three sub-dimensions, namely Success and Recovery (5 items), Curiosity and Social Acceptance (9 items), and Uncertainty in Game Request (5 items), and Cronbach's alpha (α) reliability coefficient values are α=.70, α=.87, and α=.72, respectively. The original scale's Cronbach Alpha, internal consistency coefficient, is .82, whereas for this research sample, it is α=.841.

Digital Play Addiction Scale for Children

Digital Play Addiction Scale for Children (DGASFC), developed by Hazar & Hazar (2017), was used in the research. The scale consisted of 24 questions, and a five-point Likert-type rating was used. There is no reverse-scored item on the scale. Rating of the scale according to the score ranges; 24 points: normal, 25-48 points: low risk, 49-72 points: risky, 73-96 points: addicted, 97-120 points: highly addicted. The scale has four sub-dimensions as Excessive Focus and Conflict on Playing Digital Game (7 items), Tolerance Development in Game Play and Value Added to Game (7 items), Postponement of Individual and Social Duties / Assignments (6 items), and Psychological-Physiological Reflection of Dysnity and Diving in Game (4 items) and Cronbach's alpha (α) reliability coefficient values are α=.78, α=.81, α=.76 and α=.67, respectively. The original scale's Cronbach Alpha, internal consistency coefficient, is .90, whereas for this research sample, is α=.946.

Analysis of Data

The software used in the analysis of the data was IBM SPSS 21.0 and the significance level was $p < .05$. It was determined by the Kolmogorov-Smirnov test that the data were not normally distributed. The relationship between the qualitative variables was examined with the Chi-Square Independence test, and the effect size was examined with the Cramér's V value. Cramér's V effect sizes are generally evaluated as negligible association (.00 and under .10), weak association (.10 and under.20), moderate association (.20 and under .40), relatively strong association (.40 and under .60), strong association (.60 and under .80), and very strong association (.80 and under 1.00) (Rea & Parker, 2014). Mann-Whitney U test was used for two groups and Kruskal Wallis test was used for more than two groups in comparisons according to mean rank. Effect size values are interpreted as 0.10 small, 0.30 medium, 0.50 large effects for r, and 0.01 small, 0.06 medium and 0.14 large effects for Eta squared (Cohen, 1988). The Spearman Correlation test examined the relationship between the scale and its sub-dimensions.

Results

The Chi-Square Independence test was used to compare the students' gender, the number of siblings, and grade level variables according to their digital game playing status, and the results are shown in Table 1, along with their age and electronic device information. Among the 394 students participating in the research, the number of

those who play digital games is 254 (64.5%), and the number of those who do not play digital games is 140 (35.5%). It is seen that there is a statistically significant and moderate relationship between gender and playing digital games (p< .05). There is a statistically significant and weak correlation between the number of siblings and the situation of playing digital games (p< .05). The descriptive values of motivation and addiction towards digital gaming in the study are given in Table 2.

Table 1. Descriptive information by age and digital game playing status

Descriptive informations	Age(month)	Do you play digital games?							
		Yes			No			Total	
	M±SD	N	Row N %	Column N %	N	Row N %	Column N %	N	Column N %
Total	153.3±11.5	254	64.5	100.0	140	35.5	100.0	394	100.0
Gender (χ^2=45.510 *p*=.000* V=.340)									
Boys	153.9±11.6	140	83.3[a]	55.1	28	16.7[a]	20.0	168	42.6
Girls	152.8±11.5	114	50.4[b]	44.9	112	49.6[b]	80.0	226	57.4
Number of Siblings (χ^2=4.904 *p*=.027* V=.112)									
≤ 1	150.5±11.7	133	70.0[a]	52.4	57	30.0[a]	40.7	190	48.2
≥ 2	156.1±10.7	121	59.3[b]	47.6	83	40.7[b]	59.3	204	51.8
Grade Level (χ^2=0.921 *p*=.820)									
5th	133.8±3.2	47	67.1	18.5	23	32.9	16.4	70	17.8
6th	146.2±6.4	43	68.3	16.9	20	31.7	14.3	63	16.0
7th	156.9±3.6	94	62.7	37.0	56	37.3	40.0	150	38.1
8th	164.1±5.5	70	63.1	27.6	41	36.9	29.3	111	28.2
Electronic Device (multiple response)									
Smartphone		147	69.3	63.9	65	30.7	58.0	212	62.0
Tablet		121	72.5	52.6	46	27.5	41.1	167	48.8
Computer		113	75.8	49.1	36	24.2	32.1	149	43.6
Game Console		15	100.0	6.5	0	0.0	0.0	15	4.4

Note. V= Cramer's V
a-b Means in columns without a common superscript are statistically different according to z-test analysis (p<.05)
*p< .05

Table 2. Descriptive values of motivation and addiction towards digital gaming

Scales	Minimum	Maximum	M	SD
DGPMS-F1	5	25	14.90	4.07
DGPMS-F2	9	45	28.48	8.90
DGPMS-F3	5	25	16.28	4.64
DGPMS	21	93	59.66	12.13
DGASFC-F1	7	35	13.91	6.04
DGASFC-F2	7	35	17.87	6.46
DGASFC-F3	6	30	11.15	5.22
DGASFC-F4	4	20	7.94	3.62
DGASFC	24	118	50.87	19.09

Note: DGPMS-F1=Success and Recovery, DGPMS-F2=Curiosity and Social Acceptance, DGPMS-F3=Uncertainty in Game Request, DGPMS=Digital Game Playing Motivation Scale, DGASFC-F1=Excessive Focus and Conflict on Playing Digital Game, DGASFC-F2=Tolerance Development in Game Play and Value Added to Game, DGASFC-F3=Postponement of Individual and Social Duties/Assignments, DGASFC-F4=Psychological-Physiological Reflection of Dysnity and Diving in Game, DGASFC=Digital Play Addiction Scale for Children

The Mann-Whitney U test was used to compare motivation and addiction towards digital gaming of the students in the study by gender, and it is shown in Table 3. Success and Recovery, Curiosity and Social Acceptance, Digital Game Playing Motivation, Excessive Focus and Conflict on Playing Digital Game, Tolerance Development in Game Play and Value Added to Game, and Digital Play Addiction levels show a statistically significant difference at the small effect level according to gender (p< .05). There is no significant difference in the levels of Uncertainty in Game Request, Postponement of Individual and Social Duties/Assignments, and Psychological-Physiological Reflection of Dysnity and Diving in Game according to the gender (p> .05).

Table 3. Comparison of motivation and addiction towards digital gaming by gender

Scales	Gender-Mean Rank		U	Z	*p*	r
	Boys(n=140)	Girls(n=114)				
DGPMS-F1	137.93	114.69	6519.500	-2.516	.012*	-0.16
DGPMS-F2	137.95	114.67	6517.500	-2.513	.012*	-0.16
DGPMS-F3	134.17	119.31	7046.500	-1.607	.108	-
DGPMS	142.15	109.51	5929.500	-3.522	.000*	-0.22
DGASFC-F1	137.37	115.38	6598.000	-2.379	.017*	-0.15
DGASFC-F2	137.85	114.79	6530.500	-2.493	.013*	-0.16
DGASFC-F3	133.46	120.18	7146.000	-1.443	.149	-
DGASFC-F4	133.69	119.90	7114.000	-1.499	.134	-
DGASFC	136.77	116.12	6682.500	-2.229	.026*	-0.14

Note: DGPMS-F1=Success and Recovery, DGPMS-F2=Curiosity and Social Acceptance, DGPMS-F3=Uncertainty in Game Request, DGPMS=Digital Game Playing Motivation Scale, DGASFC-F1=Excessive Focus and Conflict on Playing Digital Game, DGASFC-F2=Tolerance Development in Game Play and Value Added to Game, DGASFC-F3=Postponement of Individual and Social Duties/Assignments, DGASFC-F4=Psychological-Physiological Reflection of Dysnity and Diving in Game, DGASFC=Digital Play Addiction Scale for Children

*p< .05

The Mann-Whitney U test was used to compare the students' motivation and addiction towards digital gaming in the study according to the number of siblings, and it is shown in Table 4. Motivation and addiction towards digital gaming do not show a statistically significant difference according to the number of siblings (p>.05).

Table 4. Comparison of motivation and addiction according to the number of siblings

Scales	Number of Siblings-Mean Rank		U	Z	*p*
	≤ 1 (n=133)	≥ 2 (n=121)			
DGPMS-F1	121.78	133.79	7286.000	-1.305	.192
DGPMS-F2	121.79	133.78	7287.000	-1.300	.194
DGPMS-F3	133.77	120.61	7212.500	-1.429	.153
DGPMS	122.94	132.51	7440.500	-1.037	.300
DGASFC-F1	125.12	130.11	7730.500	-.542	.588
DGASFC-F2	121.44	134.16	7240.500	-1.380	.167
DGASFC-F3	121.47	134.13	7244.500	-1.382	.167
DGASFC-F4	123.06	132.38	7455.500	-1.019	.308
DGASFC	122.41	133.09	7370.000	-1.157	.247

Note: DGPMS-F1=Success and Recovery, DGPMS-F2=Curiosity and Social Acceptance, DGPMS-F3=Uncertainty in Game Request, DGPMS=Digital Game Playing Motivation Scale, DGASFC-F1=Excessive Focus and Conflict on Playing Digital Game, DGASFC-F2=Tolerance Development in Game Play and Value Added to Game, DGASFC-F3=Postponement of Individual and Social Duties/Assignments, DGASFC-F4=Psychological-Physiological Reflection of Dysnity and Diving in Game, DGASFC=Digital Play Addiction Scale for Children

Table 5. Comparison of motivation and addiction by grade level

Scales	Grade Level - Mean Rank				χ^2	*p*	η^2
	5th n=47	6th n=43	7th n=94	8th n=70			
DGPMS-F1	105.06	126.06	128.15	142.58	7.406	.060	
DGPMS-F2	102.83	123.14	126.55	148.01	10.938	.012*[a]	.04
DGPMS-F3	132.04	138.44	127.85	117.26	2.506	.474	
DGPMS	101.84	127.06	128.27	143.97	9.271	.026*[a]	.03
DGASFC-F1	100.77	150.23	126.71	132.55	10.739	.013*[b]	.04
DGASFC-F2	105.13	137.64	126.29	137.91	6.630	.085	
DGASFC-F3	103.79	149.67	121.87	137.36	10.784	.013*[b]	.04
DGASFC-F4	113.79	141.23	124.44	132.39	3.674	.299	
DGASFC	101.85	147.31	124.23	136.94	10.203	.017*[a,b]	.04

Note: DGPMS-F1=Success and Recovery, DGPMS-F2=Curiosity and Social Acceptance, DGPMS-F3=Uncertainty in Game Request, DGPMS=Digital Game Playing Motivation Scale, DGASFC-F1=Excessive Focus and Conflict on Playing Digital Game, DGASFC-F2=Tolerance Development in Game Play and Value Added to Game, DGASFC-F3=Postponement of Individual and Social Duties/Assignments, DGASFC-F4=Psychological-Physiological Reflection of Dysnity and Diving in Game, DGASFC=Digital Play Addiction Scale for Children.
Mann Whitney U test was used and results with a p< .0125 difference after Bonferroni correction.
[a]5th-8th, [b]5th-6th
*p< .05

The Kruskal-Wallis test was used to compare the students' motivation and addiction towards digital gaming in the study according to the grade level, and the Mann-Whitney U test was used for the source of the difference and is shown in Table 5. Curiosity and Social Acceptance, Digital Game Playing Motivation, Excessive Focus and Conflict on Playing Digital Game, Postponement of Individual and Social Duties / Assignments and Digital Play Addiction levels show a statistically significant difference at the large effect level according to grade level (p< .05). There is no significant difference in the levels of Success and Recovery, Uncertainty in Game Request, Tolerance Development in Game Play and Value Added to Game, and Psychological-Physiological Reflection of Dysnity and Diving in Game according to the grade level (p> .05).

The Spearman Correlation test was used, and the relationship between motivation and addiction towards digital gaming sub-dimension and total scale scores of the students participating in the study is shown in Table 6. There is no statistically significant relationship between the level of Uncertainty in Game Desire and the level of Digital Game Playing Motivation (p> .05). However, the relationship between all other sub-dimensions and the total scores of the scales is statistically significant (p< .05).

Table 6: Relationship between motivation and addiction towards digital gaming

Scales	1	2	3	4	5	6	7	8	9
1.DGPMS-F1	1.000	.717**	-.211**	.784**	.421**	.621**	.323**	.475**	.556**
2.DGPMS-F2		1.000	-.182**	.918**	.437**	.655**	.335**	.382**	.562**
3.DGPMS-F3			1.000	.121	-.188**	-.138*	-.191**	-.189**	-.205**
4.DGPMS				1.000	.403**	.649**	.290**	.387**	.537**
5.DGASFC-F1					1.000	.675**	.752**	.701**	.898**
6.DGASFC-F2						1.000	.561**	.614**	.872**
7.DGASFC-F3							1.000	.606**	.821**
8.DGASFC-F4								1.000	.800**
9.DGASFC									1.000

Note: DGPMS-F1=Success and Recovery, DGPMS-F2=Curiosity and Social Acceptance, DGPMS-F3=Uncertainty in Game Request, DGPMS=Digital Game Playing Motivation Scale, DGASFC-F1=Excessive Focus and Conflict on Playing Digital Game, DGASFC-F2=Tolerance Development in Game Play and Value Added to Game, DGASFC-F3=Postponement of Individual and Social Duties/Assignments, DGASFC-F4=Psychological-Physiological Reflection of Dysnity and Diving in Game, DGASFC=Digital Play Addiction Scale for Children
*p< .05 **p< .01

Discussion

According to this study, in which secondary school students participated, the number of digital game players is higher. Although the number of students who state that they play digital games is higher than those who do not, the rate of students who state that they do not play digital games at 35.5% is at a level that cannot be ignored. Among those who play digital games, the proportion of boys is higher than girls, and the proportion of those who have 0-1 siblings is higher than those who have two or more siblings. As the number of siblings decreases, individuals may feel lonely, and therefore, they may turn to digital games. As the number of siblings increases, the rate of playing digital games may decrease as there is an opportunity to spend more time with siblings. There is an inverse relationship between the number of siblings and smartphone addiction, as the number of siblings decreases, smartphone addiction increases (Yıldız Durak, 2019). The grade level does not differ proportionally between those who play digital games and those who do not. The fact that students are at different grade levels also indicates that they are in different age groups. We can say that grade level and accordingly age do not have any decisive influence on the decisions about whether to play digital games or not. The order of electronic

devices owned by the students participating in the research from most to least is a smartphone, tablet, computer, and game console. All of the students who have a game console play digital games but the number of students with a game console is low. The insufficient economic level is one reason of this. Öztürk Eyimaya et al. (2020), listed the electronic devices that primary school fourth-grade students own from most to least as tablets, computers, mobile phones, and game consoles. The fact that the types and numbers of electronic devices students own contain similar results may be due to the similarity of socio-economic structures.

The digital gaming motivation (M=59.66 SD=12.13) scores of the students in our study are slightly above the scale average. Yılmaz (2021), in his study with high school students, determined the sub-dimension and scale mean scores to be Success and Recovery (M=16.60 SD=3.94), Curiosity and Social Acceptance (M=32.33 SD=8.18), Uncertainty in Game Request (M=16.60 SD=3.94) and Digital Game Playing Motivation (M=64.83 SD=13.57) were similar to our study. When the total score averages of the participants' digital gaming addiction are evaluated, the level of addiction is generally between low-risk and risky degrees. Güvendi et al. (2019), in their research with 279 secondary school students, found that the participants were in the risky group according to the average values of the digital game addiction scale, similar to our study.

The hypothesis "H_{01}: Gender has no effect on motivation and addiction to digital gaming" was rejected. According to gender, Success and Recovery, Curiosity and Social Acceptance, Digital Game Playing Motivation, Excessive Focus and Conflict on Playing Digital Game, Tolerance Development in Game Play and Value Added to Game, and Digital Play Addiction levels are higher in boys than girls. There is no difference between boys and girls in the levels of Uncertainty in Game Request, Postponement of Individual and Social Duties/Assignments, and Psychological-Physiological Reflection of Dysnity and Diving in Game. In the studies conducted with secondary school (Bozkurt & Tamer, 2020) and high school (Tekkurşun Demir & Cicioğlu, 2019) students, there was a significant difference in favor of boys in the levels of Success and Recovery, Curiosity and Social Acceptance ($p<,05$) and there was no significant difference in terms of gender at the level of Uncertainty in Game Request ($p> .05$) was determined in a similar way to the results in our study. Significant differences in favor of boys in the digital gaming motivation by gender are similar during the academic year and the summer vacation (Yılmaz, 2021). These essential findings are consistent with research showing that the digital game addiction level scores according to gender were statistically significantly different in favor of males (Gülbetekin et al., 2021; Güvendi et al., 2019; Özturk Eyimaya et al., 2020). During computer games, the mesocorticolimbic reward system shows more activation and functional connectivity in men than in women, resulting in significant gender differences in reward and addiction (Hoeft et al., 2008). The game behavior predictors of male adolescents (violence, self-efficacy, and psychosocial problems) are significantly different from those of females (Irmak & Erdoğan, 2019). In addition to the sources of differences between males and females mentioned in the literature, environmental factors may be among the reasons why the level of motivation to play digital games is higher in males. One reason for the high motivation may be that boys talk more about digital games with their friends than girls.

The hypothesis "H_{02}: The number of siblings has no effect on motivation and addiction to digital gaming" was accepted. The students' motivation and addiction towards digital gaming in this study are not affected by the number of siblings. The number of siblings is not a statistically significant predictor of smartphone addiction (Yıldız Durak, 2019). There is no statistically significant relationship between the number of siblings and the level of internet addiction in high school students (Üneri & Tanıdır, 2011). Similar research results on smartphone and internet addiction support our findings. The fact that the number of siblings is less or more will not change the level of influence on each other, so it can be expected that there will be no differentiation in both motivation and addiction levels.

The hypothesis "H_{03}: Grade level has no effect on motivation and addiction to digital gaming" was rejected. According to grade level: Curiosity and Social Acceptance and Digital Game Playing Motivation levels are higher in 8th grades than in 5th grades, Excessive Focus and Conflict on Playing Digital Game and Postponement of Individual and Social Duties/Assignments levels are higher in 6th grades than in 5th grades, and Digital Play Addiction level is higher in 8th and 6th grades than in 5th grades. There is no significant difference between grade levels in the levels of Success and Recovery, Uncertainty in Game Request, Tolerance Development in Game Play and Value Added to Game, and Psychological-Physiological Reflection of Dysnity and Diving in Game. Bozkurt and Tamer (Bozkurt & Tamer, 2020) found that the Curiosity and Social Acceptance level was higher in 8th grades compared to 5th grades ($p< .05$), and there was no difference in Success and Recovery and Uncertainty in Game Request levels according to grade level. Tekkurşun Demir & Cicioğlu (2019), found that there was a significant difference in favor of the 11th grade at the Curiosity and Social Acceptance level and favor of the 10th grade at the Uncertainty in Game Request level in high school ($p< .05$). 8th grade students play more video games than 5th grade students (Greenberg et al., 2010). It is an

acceptable result that 8th and 6th grade students have higher motivation and addiction levels since they have been playing digital games longer than 5th grade students.

The hypothesis "H_{04}: There is no relationship between motivation and addiction to digital gaming" was rejected. Uncertainty in Game Desire and Digital Game Playing Motivation levels are not related, but all other sub-dimensions and the total scores of the scales are correlated with each other. Hazar (2019), stated in his study that all sub-dimensions of motivation for digital gameplay were statistically significantly correlated and that the Uncertainty in Game Request sub-dimension had a negative and significant relationship with other sub-dimensions ($p< .05$). Gülbetekin et al. (2021), in their study, found a positive and significant relationship between all of the Digital Play Addiction sub-dimensions and total scores, which supports our study. As the level of motivation to play digital games increases, students play more games and this increasing their level of addiction.

As a result, the situation of playing digital games (yes/no) is significantly related to gender (in favor of boys) and the number of siblings (in favor of those with ≤ 1 sibling), but not with the grade level in secondary school. Motivation and addiction towards digital gaming are significantly affected by gender (in favor of boys) and grade level (in favor of 8th graders), but not by the number of siblings. There is a positive and significant relationship between motivation and addiction levels towards digital games. In light of these results, practical implications for preventing digital game addiction were proposed. Educational institutions, families, and communities can organize awareness campaigns to explain digital game addiction's potential risks and effects. Digital game playing times may be restricted. Increasing family interaction and spending more time together can balance children's digital game playing time. Children can be encouraged to do sports, spend time outdoors and be more active. Although the suggestions may be seen as general, based on the results of the research, more effort should be made for males according to gender and for 8th graders according to grade level.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in JESEH journal belongs to the authors.

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