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Behind the Screen: The Effect of Social and Emotional Loneliness on Digital Game Addiction

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Abstract

Especially in recent years, digital game addiction has been rapidly increasing among children and adolescents and negatively affects the social skill development of individuals in adolescence. At this point, it is noteworthy that digital game addiction is more common among children and adolescents who experience social and emotional loneliness and that it may have serious consequences at an individual and societal level in the long term. This research was designed to reveal the effect of social and emotional loneliness on young people's digital game addiction. In the study where the quantitative research method was used, data were collected from 402 university students via face-to-face survey technique. The research results indicate that men have a higher level of digital game addiction than women. It was determined that as the frequency of participants installing digital games on their smart devices increased, there was an increase in their digital game addiction levels. Similarly, as the frequency of university students purchasing digital games increased, the increase in their digital game addictions manifested itself. An important finding of this research is that social, emotional familial and emotional romantic loneliness has a positive and significant effect on digital game addiction. It can also be said that the duration of playing digital games partially mediates the relationship between social and emotional loneliness and digital game addiction.

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Introduction

As a result of a poll organized by the Turkish Language Association, the phrase *"crowded loneliness"* was selected as the word of the year for 2024. This concept highlights the paradox of individuals feeling a profound sense of loneliness despite being surrounded by crowds in the digital age. Although "loneliness" and "crowdedness" appear to be opposites, contemporary conditions allow them to coexist on the same plane. This phenomenon, which can be explained through the lenses of sociology, psychology, and communication studies, manifests itself in individuals' daily lives and in the relationships, they establish (TDK, 2024). While the global population continues to grow and communication technologies eliminate physical distance barriers, individuals often find themselves retreating into their inner worlds within these expanding social spaces. This situation is associated with the social pressures exerted by modern societies, economic crises, identity struggles, disruptions in the sense of belonging, and the superficial interactions fostered by digital media.

This state of "being alone even when together," whether a result of choice or necessity, prompts individuals—who are inherently social beings—to redefine themselves within social relationships and seek out new forms of connection (Bal & Balcı, 2021). In this context, digital media tools, often described as the "virtual refuge" of modern individuals, emerge as mechanisms that accelerate the transformation of social bonds. These tools promote artificial forms of interaction over face-to-face communication and, in doing so, contribute to individuals becoming alienated from both their surroundings and them (Sezerer Albayrak, 2019).

One of the primary refugees' individuals turn to in response to the loneliness experienced in social life has been the virtual world provided by digital technologies. Smartphones, social media platforms, and digital games offer individuals momentary relief and an artificial sense of connection; however, the use of these tools is often fueled by feelings of loneliness. Particularly among children and young people—who are developmentally inclined toward such platforms, digital games have become one of the most popular domains. In this process, they attempt to fill emotional voids and alleviate feelings of loneliness through gaming. Yet, loneliness not only triggers this orientation but also increases the risk of developing digital game addiction. This tendency paves the way for the deepening of social and emotional loneliness and the reinforcement of addictive behaviors related to digital gaming (Ehsan & Gul, 2023; Ekinci et al., 2019; Embang et al., 2024; Kök Eren & Örsal, 2018; Wang et al., 2019; Gao et al., 2024; Vuorinen et al., 2024).

In light of these introductory assessments, understanding the impact of "loneliness" on digital game addiction is of critical importance for analyzing the digital behavior patterns of today's youth. From this perspective, the present study aims to empirically reveal the effect of social and emotional loneliness on digital game addiction. To this end, a field study was conducted with 402 students from Necmettin Erbakan University in Konya/ TURKEY who regularly engage in digital gaming. Using a quantitative research method, the study tested three hypotheses developed in line with the literature to determine the effect of social and emotional loneliness on digital game addiction. The study seeks to deepen the findings in this area by identifying how different types of loneliness influence digital game addiction.

Literature Review

Digital Game Addiction

Digital games are software-based interactive games played via computers, mobile devices, tablets, game consoles, and similar digital technologies. With the advancement of information and communication technologies, digital games are now offered to users in both online (multiplayer or content accessible via internet connection) and offline (single-player or not requiring internet connection) formats (Çakmak, 2023). Thus, digital games can be played individually, cooperatively or competitively with physically present players or with thousands of others online and are accessible across a wide range of devices from consoles to computers and smartphones (Granic et al., 2014).Since the early 2000s, the rapidly developing digital game industry has evolved into a domain attracting large-scale commercial investments. This transformation has been fueled by advancements in high-performance graphics systems, graphics cards, and processors used in computers. In recent years, the growing interest in online games has significantly increased the global number of players (Gao et al., 2024). As indicated by data collected by Newzoo in 2020, the digital game industry grew by 9.3% during the COVID-19 pandemic, reaching a market value of 159 billion USD. Projections suggest that the sector will exceed 295 billion USD by 2026 (Digital Games Report, 2020).

In today's world, digital games have become more than just a form of entertainment; they have emerged as major platforms for leisure and social interaction (Kezhalhousa & Mylliemngap, 2024). While appealing to individuals of all ages, digital games are especially popular among adolescents and young adults. The thrilling features offered by multiplayer online games in particular lead users to spend extended time in front of screens (Mun & Lee, 2022; Lee & Kim, 2017).The uncontrolled increase in gameplay duration may lead to a behavioral addiction pattern, posing a risk of developing into dependency over time. In psychiatric literature, game addiction is characterized as an impulse control disorder, with symptoms such as inability to control gameplay duration, loss of interest in other activities, continued gaming despite negative consequences, and psychological withdrawal symptoms when unable to play (Yalçın Irmak & Erdoğan, 2016). However, Kuss and Griffiths (2012) propose that problematic digital gaming may be more appropriately conceptualized as a behavioral addiction rather than an impulse control disorder. As in numerous other studies (Göker & Tekedere, 2022; Gupta et al., 2024; Kezhalhousa & Mylliemngap, 2024; Miezaha et al., 2020; Önder et al., 2021), the term "digital game addiction" is used in this study to maintain conceptual consistency and align with contemporary academic trends in describing excessive and uncontrolled engagement with digital games.

Various scientific studies on the effects of digital games on young individuals have shown that such games can produce both positive and negative outcomes (Demir, 2024). On the one hand, digital games can enhance psychological attributes such as strategic thinking, problem-solving, spatial awareness, and rapid decision-making abilities (Çeken & Merdin, 2024), and foster positive emotional states such as stress relief, emotional relaxation, inner peace, and happiness. These reinforcing emotional effects increase the appeal of gameplay and may facilitate the emergence of addictive behaviors over time (Embang et al., 2024).Given that digital games tend to be more appealing to children and adolescents, these age groups are at a higher risk of developing gaming addiction (Kaya, 2022; Kuss & Griffiths, 2012). The primary risks associated with digital game addiction include the weakening

of young individuals' social relationships and a decline in academic performance (Dikmen et al., 2022; Savcı & Aysan, 2017). Furthermore, such addiction may lead to unhealthy eating habits, physical problems such as obesity (Yardımcı & Ulukol, 2020) and expose young people to serious risks such as cyberbullying (Ayaz Alkaya & Köse Kabakçıoğlu, 2025), exploitation, and criminal involvement (Kavenagh, 2023).

Among the psychosocial risks associated with digital game addiction, a particularly significant and recently researched factor is the phenomenon of social and emotional loneliness. Children and adolescents, who are in developmentally vulnerable periods, are increasingly distancing themselves from real-life relationships and turning toward digital environments due to weakening social interactions. This intensifies feelings of loneliness, which in turn leads to increased time spent on digital games and, more critically, heightens the risk of addiction. These dynamics create a reciprocal cycle (Kavlak et al., 2022; Parlak et al., 2023; Snodgrass et al., 2018; Yang et al., 2022). In this context, when considered within the framework of individuals' digital life practices, a symbiotic relationship can be observed between loneliness and game addiction.

Loneliness and Digital Game Addiction

Human beings are inherently social creatures; in addition to meeting their biological needs, they require interaction with others, a sense of belonging, and the formation of social bonds in order to live a meaningful and sustainable life. One of the greatest threats to this fundamental human characteristic is loneliness. In this context, loneliness is defined as an unpleasant and distressing emotion arising from a lack of social interaction. Although often associated with social isolation, individuals may sometimes feel lonely even when surrounded by others (Yaw et al., 2021).In literature, loneliness has been classified in various ways and is generally divided into two main types: social and emotional loneliness. Social loneliness is described as a subjective negative emotion resulting from the lack of relationships or broader social networks. In contrast, emotional loneliness stems from internal factors such as personality traits or psychological characteristics, which lead to a lack of interest in social relationships (Valtorta & Hanratty, 2012).

When individuals feel socially excluded or lonely, they tend to seek ways to meet their needs or relieve stress. In today's world, digital environments have become a convenient refuge for lonely individuals who struggle to establish social relationships. Digital games have emerged as easily accessible tools for relieving stress and fulfilling desires. Consequently, children and adolescents who face challenges in the socialization process are increasingly turning to digital games rather than engaging in direct communication with others (Yaw et al., 2021).Thus, digital games have evolved beyond mere entertainment tools and have become influential in individuals' social and psychological existence. The notion that digital environments serve as a refuge for lonely individuals is supported not only by theoretical discussions but also by empirical studies conducted across different age groups and cultural contexts. Studies examining the impact of loneliness on digital game addiction have provided concrete evidence of these trends.

For instance, a study conducted with university students in Pakistan revealed a significant positive relationship between loneliness and motivations for playing online games. Online game addiction was found to be a reinforcing

factor in this relationship. Male students were found to have higher game motivation and playtime compared to female students (Ehsan & Gul, 2023). Similarly, a longitudinal study conducted with university students in China during the pandemic period showed that loneliness had a direct effect on online game addiction. Fear of missing out (FoMO) was found to partially mediate the relationship between loneliness and addiction, and this effect was stronger among individuals with high sensation-seeking tendencies (Gao et al., 2024). A study conducted in Finland with 1,530 participants also revealed that loneliness increased game addiction at both interpersonal and intrapersonal levels (Vuorinen et al., 2024). In another study from Indonesia involving 100 late adolescents aged 17 to 21 who had played online games within the past year, a strong and significant relationship was found between loneliness and online game addiction. The findings indicated that loneliness significantly contributed to online game addiction, increasing the risk for lonely individuals to develop addictive behaviors (Embang et al., 2024). A study conducted in Turkey with students from grades 5 through 8 also found a moderate and positive relationship between levels of loneliness and digital game addiction. Students who participated in sports activities were found to have lower levels of both loneliness and digital game addiction compared to those who did not (Ekinci et al., 2019). These findings highlight loneliness as a significant risk factor for digital game addiction.

On the other hand, in addition to studies exploring the impact of loneliness on digital game addiction, research has also been conducted on whether digital game addiction affects loneliness (Çelik & Ulusoy, 2019; Kaymak & Hergüner, 2021; Prince et al., 2023). For example, a study by Ghosh and Mukherjee involving 100 adolescents aged 13 to 19 in India found a significant relationship between loneliness and video game addiction. Adolescents with high levels of video game addiction exhibited increased levels of loneliness, neuroticism, and openness, while those with lower addiction levels showed higher levels of conscientiousness (2024). In a study conducted by Yağmur and Yıldız with 753 middle school students in Aydın, Turkey, students who owned digital devices and spent extended periods using them exhibited higher levels of both game addiction and perceived loneliness (2021). Similarly, another study conducted in Istanbul with 843 middle school students found that loneliness negatively affected learning processes and that excessive time spent on computer or video games could lead to psychological problems such as loneliness (Erkoç et al., 2015).

Method

In this study, which investigates the effect of social and emotional loneliness on digital game addiction, a quantitative research method was employed.

Research Models and Hypotheses

In order to reveal the level of interaction between multiple variables, the Relational Screening Model (Şimşek, 2012) was adopted. This model primarily aims to determine the relationships between variables and to identify potential causal effects (Fraenkel et al., 2012). In the first model, digital game addiction is defined as the dependent variable, while social loneliness, emotional familial loneliness, and emotional romantic loneliness are treated as independent variables.

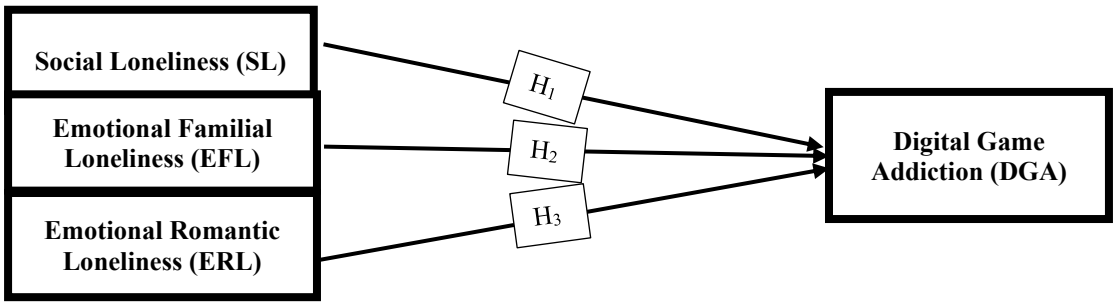

Figure 1. Research Model 1

In the second model of the research, the mediating role of usage time in the relationship between social and emotional loneliness and digital game addiction is investigated.

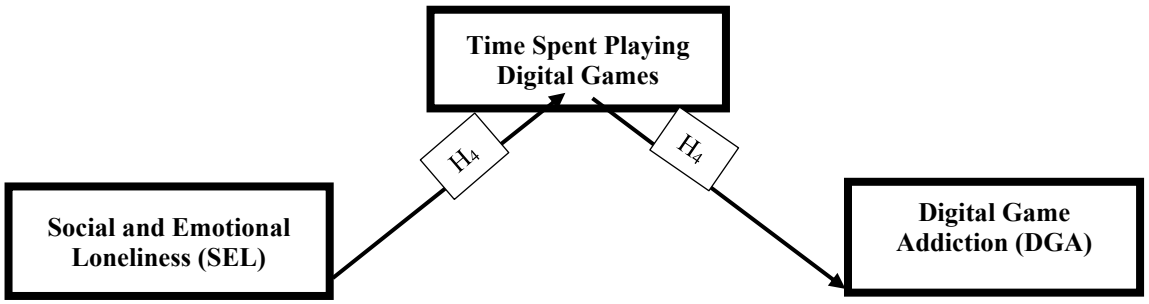

Figure 2. Research Model 2

Based on the literature discussions, and considering the two models mentioned above, four hypotheses have been formulated to be tested in this study:

Hypothesis 1: Social loneliness has a significant positive effect on digital game addiction.

Hypothesis 2: Emotional familial loneliness has a significant positive effect on digital game addiction.

Hypothesis 3: Emotional romantic loneliness has a significant positive effect on digital game addiction.

Hypothesis 4: Digital media usage time mediates the relationship between socio-emotional loneliness and digital game addiction.

Participants

The population of this study consists of students enrolled at Necmettin Erbakan University who play digital games. Digital games are a highly popular form of entertainment among young people, who have long occupied a central position in discourses surrounding gaming. For youth, digital gaming can serve as a significant part of social life, provide relaxation, and support coping with daily challenges. Additionally, it can contribute to identity construction. Beyond playing games, young people also interact with gaming cultures in various other ways: they seek information, watch livestreams and videos, and may create new content themselves (Merilainen, 2023). In this context, many young individuals grow up surrounded by digital tools that become a vital part of their lives. Data indicates that children aged 8 to 14 play digital games for over an hour daily on average; by the time they

reach the age of 21, adolescents and young adults tend to spend extended periods gaming (Vie et al., 2024). It is widely acknowledged that the growing passion for digital games and their excessive and uncontrolled use have become prevalent among adolescents and young adults (Yalçın Irmak & Erdoğan, 2016). Studies often suggest that excessive gaming can lead individuals to form connections in online environments while becoming socially isolated in offline settings, labeling intense gamers as socially withdrawn individuals (Kowert et al., 2012). In recent years, the shift in leisure-time habits and the central role of digital games among youth have sparked significant interest among policymakers, educators, and researchers regarding the potential impacts on both gamers and society at large (Eden & Eshet-Alkalai, 2014, p. 450).

The sample of this study consists of university students selected through convenience sampling, which is a type of non-probability sampling technique. It is known that a minimum of 383 participants is required to adequately represent the population at a 95% confidence interval (Gürbüz & Şahin, 2017). The final sample comprises 402 volunteer students from Necmettin Erbakan University.Of the participants, 48.8% are male and 51.2% are female. This distribution appears to be suitable for conducting comparative statistical analyses. The ages of the participants range from 17 to 48 years, with a mean age of 21.48.

Data Collection Tools

Digital Game Addiction Scale (DGAS-7): Considering the developmental characteristics of adolescents, the short form of the Digital Game Addiction Scale (DGAS-7), developed by Lemmens et al. (2009), is used to assess individuals' game addiction. The DGAS-7 consists of seven items rated on a five-point Likert scale (1 = never, 5 = very often). Adolescents who score three (sometimes) or higher on all items are multidimensionally addicted, while those who score three or higher on at least four items are classified as unidimensional addicted. Lemmens and colleagues suggested that researchers can use both unidimensional and multidimensional formats when defining game addiction (Bilginer et al., 2021). The Turkish adaptation of the scale was conducted by Yalçın Irmak and Erdoğan (2016). In the study by Balcı and Tezer (2024), the reliability coefficient of the scale was found to be .76.

Social and Emotional Loneliness Scale for Adults–Short Form (SELSA-S): Originally developed by DiTommaso and Spinner (1993, 1997), the scale was adapted into Turkish by Akgül (2020). It consists of 15 items on a 7-point Likert scale. The scale includes three subdimensions: Social Loneliness (SL), Emotional Family Loneliness (EFL), and Emotional Romantic Loneliness (ERL). In Akgül's (2020) study, the internal consistency coefficients were found to be ERL = .85, EFL = .76, and SL = .82. Cronbach's alpha coefficient for the entire scale was reported as .83. These values indicate good internal consistency and reliability. In the study by Balcı et al. (2024), internal consistency coefficients for the three subdimensions ranged between .73 and .89.

Personal Information Form: This section of the data collection tool includes demographic variables such as gender and age of the university students participating in the study. Additionally, questions were designed to identify participants' digital gaming patterns.

Data Analysis of the Study

The data for this field study were collected between October 1 and 15, 2024, from students at Necmettin Erbakan University. Statistical package programs were utilized for data analysis. Initially, descriptive analyses were conducted for each variable included in the questionnaire. Confirmatory Factor Analysis (CFA) was employed to ensure the constructing validity of the scales used in the study. To analyze the direction and strength of the relationship between dependent and independent variables, Correlation Analysis was conducted. Differences in scores on digital game addiction and the sub-dimensions of social and emotional loneliness by gender were examined using the Independent Samples T-Test. Additionally, differences in digital game addiction levels based on the frequency of downloading and purchasing digital games on smart devices were analyzed using One-Way Analysis of Variance (ANOVA). To test the hypotheses developed within the scope of the research, Linear Regression Analysis and Hayes' PROCESS macro method were applied.

Ethics Committee Approval

Throughout the writing process of this research, scientific principles, citation rules, and ethical standards were strictly followed; no data manipulation was carried out. This study has not been submitted for publication to any academic journal. Ethical approval for the implementation phase of the study was obtained from the Ethics Committee for Social and Human Sciences at Necmettin Erbakan University with the decision dated 26/07/2024 and numbered 2024/635.

Findings

Reliability and Validity Analyses of the Scales

To test the reliability and validity of the scales employed in the study, Cronbach's alpha (α), Composite Reliability (CR), Average Variance Extracted (AVE), and factor loadings were calculated. *Table 1* presents the test results regarding the reliability and validity of the variables used in the research.

Table 1. Reliability and Validity Analysis Results of Digital Game Addiction (DGA) and Social and Emotional Loneliness Scale Sub-dimensions (N=402)

SCALES	Factor Loadings	Cronbach's α	CR	AVE
DGA[1] Scale	.44- .81	.823	.823	.509
SL[2] Sub-dimensions	.55- .73	.766	.770	.403
EFL[3] Sub-dimensions	.59- .86	.845	.859	.554
ERL[4] Sub-dimensions	.30- .98	.865	.894	.705

Note: [1]**DGA**= Digital Game Addiction, [2]**SL**= Social Loneliness, [3]**EFL**= Emotional Familial Loneliness, [4]**ERL**= Emotional Romantic Loneliness

Reliability of the scales and subdimensions used in the study was evaluated by considering Cronbach's Alpha (α)

and Composite Reliability values. The literature suggests that values of 0.70 and above indicate good reliability (Byrne, 2016; Fornell & Larcker, 1981; Sürücü et al., 2023). As shown in *Table 1*, both Cronbach's Alpha (α) and Composite Reliability values exceed 0.70, indicating good reliability. Additionally, the Average Variance Extracted (AVE) values and standardized factor loadings of the scale items being above 0.50 demonstrate convergent validity (Byrne, 2016; Hair, 2010). Furthermore, there is a consensus in the literature that when composite reliability is above 0.60, convergent validity is still established even if the average variance extracted is below 0.50 (Hair et al., 2010). These results indicate that the scales meet the required conditions for reliability and convergent validity, thus are suitable for analysis. One item in the emotional romantic loneliness subdimension (ERL-3: "*I wish my emotional relationship was more satisfying*") was excluded from the analysis due to insufficient loading.

Table 2. CFA Results for Digital Game Addiction (DGA) and Social and Emotional Loneliness (SEL) Scales (N=402)

Scale/ Model	**$\Delta\chi^2$**	**df**	**$\Delta\chi^2$/df**	**p**	**RMSEA**	**GFI**	**CFI**	**SRMR**
DGA Scale	30,948	13	2.381	.003	.059	.978	.979	.034
SEL Scale	248,897	74	3.363	.000	.077	.913	.945	.076

In another part of the study, Confirmatory Factor Analysis (CFA) was conducted to ensure the structural validity of the scales used, and the constructs of the scales were examined. The results of the analyses indicated that the measurement instruments fell within acceptable ranges (Hooper et al., 2008), and the tested structures of the scales were confirmed (Hu & Bentler, 1999). Modifications were made between items e5 and e7 in the Digital Game Addiction Scale to improve model fit.

Descriptive Statistics, Correlation Analysis, and Difference Tests of the Scales

It is noteworthy that university students participating in the study reported digital game addiction scores ranging from a minimum of 7 to a maximum of 32. The mean score for digital game addiction among the participants was 15.10. In other words, it appears that the level of digital game addiction among university students is not particularly high.

Table 3. Descriptive Statistics of Digital Game Addiction (DGA) and the Subscales of the Social and Emotional Loneliness (SEL) Scale

SCALES	**Min.**	**Max.**	**$\bar{X}$**	**Skewness**	**Kurtosis**
DGA Scale	7	32	15.10	.635	-.227
SL Sub-dimensions	5	35	11.87	.979	.586
EFL Sub-dimensions	5	35	10.59	1.359	1.480
ERL Sub-dimensions	4	28	16.65	-.267	-1.497

It was determined that participants in the study scored between a minimum of 5 and a maximum of 35 on the

social loneliness subscale, which consists of 5 items. The mean score for social loneliness among university students was found to be 11.87. In addition, the mean score for emotional familial loneliness was 10.59, while the mean score for emotional romantic loneliness was 16.65. Furthermore, the skewness and kurtosis values for all four scales were within the ±1.5 range, indicating that the data were normally distributed (Terzi, 2019; Tabachnick & Fidell, 1996).

Table 4. Correlation Analysis Results (*Pearson r*) between Digital Game Addiction (DGA) and Social and Emotional Loneliness (SEL) Scale Sub-dimensions

CORRELATION ANALYSIS	**1.**	**2.**	**3.**	**4**
1. DGA Scale	1	.198**	.210**	.154**
2. SL Sub-dimensions		1	.561**	.178**
3. EFL Sub-dimensions			1	.199**
4. ERL Sub-dimensions				1

***p*< ,01

This study revealed a positive, weak, and statistically significant correlation between university students' digital game addiction and the subdimensions of social loneliness (r= .198, p< .01), emotional familial loneliness (r= .210, p< .01), and emotional romantic loneliness (r= .154, p< .01). In other words, as participants' levels of social and emotional loneliness increase, there is also an increase in digital game addiction. The strongest correlation identified in the study was between the social loneliness and emotional familial loneliness subdimensions (r= .561, p< .01).

Table 5. Differences in Scores Given to Digital Game Addiction (DGA) and Social and Emotional Loneliness (SEL) Scale Sub-dimensions according to Gender

	Gender	**N**	**Mean**	***t***	**Sig.**	**Cohen's *d***
DGA Scale	Male	196	16.88	6.68	**.000**	0.66
	Female	206	13.41			
SL Sub-dimensions	Male	196	12.84	3.29	**.001**	0.32
	Female	206	10.96			
EFL Sub-dimensions	Male	196	10.99	1.22	.222	0.12
	Female	206	10.21			
ERL Sub-dimensions	Male	196	17.04	.898	.370	0.08
	Female	206	16.28			

On the other hand, digital game addiction showed a significant difference according to the gender of the participants (t= 6.68; p< .001). The results indicated that males (M= 16.88) had higher levels of digital game addiction compared to females (M= 13.41). When examining the effect size of this significant difference using Cohen's d, a moderate effect was observed (d= 0.66) (Cohen, 1988).The levels of social loneliness among university students also differed significantly by gender (t= 3.29; p< .01). Males (M= 12.84) reported higher social

loneliness compared to females (M= 10.96). However, the effect size of this difference was small (d= 0.32). Independent samples t-test results showed no significant differences in emotional familial loneliness (t= 1.22; p> .05) and emotional romantic loneliness (t= 0.90; p> .05) according to participants' gender.

Digital Gaming Patterns and Addiction

When examining the central tendency statistics of daily digital gaming time, it was observed that university students play digital games for a minimum of 5 minutes and a maximum of 810 minutes per day. The participants' average daily digital gaming time is approximately 121 minutes.

Table 6. Descriptive Statistics of Daily Digital Game Playing Time

	N	Min.	Max.	Mean	SD
Daily Digital Game Playing Time	402	5 dk.	810 dk.	120.46	103.22

There is a significant difference in daily digital game playing time according to the gender of university students in the sample (t = 4.31, p < .001). Descriptive statistics indicate that males (M = 142.75) spend more time playing digital games compared to females (M = 99.25). Examination of the effect size for this significant difference, based on Cohen's d, revealed a moderate effect (d = 0.43) (Cohen, 1988). Among digital game genres, university students most frequently play action games (M= 2.46) and sports and competitive games (M= 2.34). Adventure games (M= 1.99), on the other hand, stand out as relatively less played digital game genres.

Table 7. Descriptive Statistics of Frequency of Playing Digital Game Types

Digital Game Types	Min.	Max.	Mean	Skewness	Kurtosis
Action games (Pubg, Call of Duty, Counter Strike, CS Go, Fry Cry 3)	1	5	2.46	.387	-1.067
Sports and competitive games (FIFA, PES, Mortal Kombat, Street Fighter, etc.)	1	5	2.34	.605	-1.014
Simulation games	1	5	2.28	.568	-.728
Strategy games (League of Legend -LOL, Age of Empires III, Crusader Kings 3 etc.)	1	5	2.21	.728	-.691
Adventure games (God of War, Minecraft, Roblox etc.)	1	5	1.99	.924	-.275

Significant differences were found in the frequency of playing action (t = 8.29; p < .001), adventure (t= 5.35; p< .001), strategy (t= 5.15; p< .001), sports and competition (t= 11.99; p< .001), and simulation games (t= 3.29; p< .001) according to participants' gender. Descriptive statistics reveal that males reported higher frequencies of playing action, adventure, strategy, sports and competition, and simulation games compared to females. Regarding the effect size of these significant differences, Cohen's d values indicated a large effect for action and sports and competition games (d= 0.82; d= 1.21), a medium effect for adventure and strategy games (d = 0.54; d = 0.51), and a small effect for simulation games (d= 0.32).

Table 8. Differences in Scores for Digital Game Genre Play Frequency according to Gender

Digital Game Types	Gender	N	Mean	*t*	Sig.	Cohen's *d*
Action games	Male	196	2.97	8.29	**.000**	0.82
	Female	206	1.97			
Adventure games	Male	196	2.31	5.35	**.000**	0.54
	Female	206	1.69			
Strategy games	Male	196	2.55	5.15	**.000**	0.51
	Female	206	1.89			
Sports and competitive games	Male	196	3.10	11.99	**.000**	1.21
	Female	206	1.62			
Simulation games	Male	196	2.48	3.29	**.001**	0.32
	Female	206	2.09			

While 4.5% of university students reported that they never install digital games on their smart devices, 38.8% stated they rarely do, 36.6% occasionally, 14.9% most of the time, and 5.2% always. Based on these results, approximately 20% of the university student sample install games on their smart devices from time to time. Additionally, when asked "How often do you purchase paid digital games?" 59% of participants responded never, 22.9% rarely, 10.9% occasionally, 6% most of the time, and 1.2% always.

Table 9. Differences in Digital Game Addiction Levels According to the Frequency of Installing Digital Games on Smart Devices and Purchasing Digital Games

	Frequency	N	Mean	*F*	Sig.
Frequency of installing digital games on smart devices	None	18	11.33	39.25	**.000**
	Rarely	156	12.70		
	Now and again	147	15.25		
	Most of the Time	60	19.96		
	Always	21	21.28		
Frequency of purchasing digital games	None	237	13.04	33.31	**.000**
	Rarely	92	16.77		
	Now and again	44	18.50		
	Most of the Time	24	20.60		
	Always	5	21.79		

There is a statistically significant difference in digital game addiction levels among university students based on how frequently they download digital games to their mobile devices ($F= 39.25$; $p< .001$). According to the results of the Tukey test conducted at the 5% significance level to determine the source of this difference, students who always download digital games to their smart devices exhibit higher addiction scores compared to other categories. In other words, as the frequency of downloading digital games to smart devices increases, digital game addiction levels also tend to rise. Similarly, the frequency with which individuals in the sample purchase digital games also

leads to significant differences in digital game addiction levels (F= 33.31; p< .001). Those who always purchase digital games exhibit higher levels of addiction than those in other categories. As university students' frequency of purchasing digital games increases, a corresponding increase in digital game addiction becomes evident.

Results of the Hypothesis Testing

In this section of the study, a model was developed to reveal the impact of the sub-dimensions of loneliness on digital game addiction. To test this model, a linear regression analysis was conducted. The results showed that social loneliness (β= .117; p< .05; 95% CI [.008–.215]), emotional-family loneliness (β= .133; p< .05; 95% CI [.016–.213]), and emotional-romantic loneliness (β= .132; p < .05; 95% CI [.023–.145]) each had a statistically significant positive effect on digital game addiction. These three independent variables collectively accounted for 7.1% of the variance in digital game addiction. In other words, 92.9% of the potential variance in digital game addiction can be attributed to other unidentified factors. These findings also support Hypotheses 1, 2, and 3.

Table 10. The Effect of Social (SL), Emotional Familial (EFL)and Emotional Romantic (ERL) Sub-dimensions on Digital Game Addiction

Path of Effect	**β**	**S.E.**	***t***	%95 Confidence Interval (CI)		
				LLCI	**ULCI**	
SL→ DGA	.117*	.055	2.010	.008	.215	***H_1 Accepted***
EFL → DGA	.133*	.050	2.280	.016	.213	***H_2 Accepted***
ERL → DGA	.132**	.031	2.708	.023	.145	***H_3 Accepted***
AR^2= .071					F= 10.81; sd= 3; p= .000	

*p< .05; **p< .01

Furthermore, to assess the mediating role of digital game playing time, the significance of the direct effect coefficient was examined (see Table 11). The analysis indicated that the direct effect remained significant, while the effect size decreased, suggesting partial mediation.

Table 11. Mediation Test Results (Hayes Process Method)

Path of Effect	**β**	**S.E.**	***t***	%95 Confidence Interval (CI)		
				LLCI	**ULCI**	
Total Effect SEL[1]→ DGA[2]	.093***	.017	5.46	.0596	.1266	***Partial Mediation Available***
Direct Effect SDY →DGPT[3]→ DGA	.071***	.014	4.89	.0429	.1004	
Indirect Effect SEL → DGPT [1]→ DGA	.021	.011		.0005	.0451	***(H_4 Accepted)***

Note: ***p< .001; [1]**SEL=** Social and Emotional Loneliness**,** [2]**DGA**= Digital Game Addiction, [3]**DGPT**= Digital Game Play Time

In the PROCESS Macro analysis method, instead of relying on the significance coefficient (p-value), confidence interval values were primarily examined to determine whether an effect is significant. Specifically, if the lower and upper bounds of the confidence interval do not include zero, the effect is considered significant. In the analysis of the mediating role of digital game playing time on the effect of social and emotional loneliness on digital game addiction, the 5000-bootstrap and 95% confidence interval results indicated that the values did not include zero (0.0005 to 0.0451). This finding suggests that digital game playing time significantly mediates the model (Sürücü et al., 2023). Accordingly, the Hayes Process method demonstrated that the presence of the mediator did not eliminate the significant effect, indicating that digital game playing time partially mediates the relationship between social and emotional loneliness and digital game addiction. These results support Hypothesis 4.

Discussion and Conclusion

Digital addiction has emerged as a public health problem due to the frequent use of technological tools by individuals in daily life under the influence of digitalization. When considered as an umbrella concept, the most significant types of digital addiction include internet addiction, smartphone addiction, social media addiction, video/film/series watching addiction, online shopping addiction, virtual sex addiction, instant messaging addiction, and digital game addiction. Among these, digital game addiction has shown a rapid increase especially in recent years among children and adolescents, negatively affecting the social skill development of individuals in their formative years. Although digital games offer players the opportunity to connect with others and enjoy a fun, interactive activity, it concerns about the potential negative effects of excessive and prolonged gaming exist. Research indicates that excessive and prolonged use of online games can lead to physical, social, and psychological problems. These issues include poor sleep habits, reduced physical activity, and increased levels of stress and anxiety. Furthermore, digital game addiction has become a public health concern that requires the attention of parents, educators, and health professionals. Digital game addiction can lead to significant behavioral changes; individuals may prioritize gaming over other activities and responsibilities. This situation can adversely affect their academic and social lives, resulting in lower academic performance and distancing from friends and family (Prince et al., 2023, p. 332). At this point, it is discussed that digital game addiction is more prevalent among children and young people experiencing social and emotional loneliness and that it may cause serious consequences at both individual and societal levels in the long term.

Based on these discussions, this study conducted with university students aimed to reveal the effect of emotional and social loneliness on digital game addiction and the mediating role of digital game playing time in this process. The results indicate that participants spend approximately two hours daily playing digital games. The tendency of university students to engage in digital games instead of spending their time more actively and productively also raises concerns about their future. Descriptive statistical results highlight that male students play digital games longer than female students. There are studies in the literature supporting these results (Çetin, 2021; Hastürk & Akyıldız Munusturlar, 2024; Ko et al., 2005; Mentzoni et al., 2011). On the other hand, some previous studies found that female students scored higher in digital game addiction than males (Bardakçı & Arslan, 2021; Deveci Topal & Çolak, 2021; Dursun & Erslan-Çapan, 2018; Sezgin et al., 2021). Action, sports, and competitive games are among the most played digital game types by university students. Adventure games were found to be relatively

less played. As the frequency of downloading digital games to smart devices increases among participants, so does their level of digital game addiction. Similarly, an increase in the frequency of purchasing digital games positively and significantly affects digital game addiction.

The study revealed a positive and significant effect of social loneliness on digital game addiction. University students who experience greater loneliness within a particular peer group tend to have higher levels of digital game addiction. This finding aligns with previous studies on technology addiction in the literature (Anlı, 2018; Balcı et al., 2024; Batmaz & Çelik, 2019; Mert & Özdemir, 2018; Sarman & Tuncay, 2023; Savcı & Aysan, 2018). Additionally, some longitudinal studies have also identified loneliness as a significant predictor of digital game addiction among adolescents (Mun & Lee, 2022). In some cases, young people and adolescents who fail to establish effective interactions with their parents may feel the urge to allocate more time to digital games to compensate for this deficiency, which can gradually lead to addictive gaming behavior (Mun & Lee, 2022).

Among the participants, as emotional familial and emotional romantic loneliness levels increase, so does digital game addiction. In other words, university students experiencing negative emotions such as loneliness tend to turn to online games to alleviate their emotional distress. This finding is supported by previous studies in the literature (Ang et al., 2018; Gao et al., 2024; Lee et al., 2019; Zhang, 2022). Digital games are known to provide an accessible and easy way to meet psychological needs and reduce stress, often facilitating connections with virtual entities instead of real-life interactions. Furthermore, individuals with higher loneliness levels may be more inclined to use digital games to alleviate feelings of isolation, increasing their risk of developing digital game addiction (as cited in Gao et al., 2024). Moreover, online social relationships may not reduce loneliness; instead, loneliness can negatively affect offline social relationships (Yao & Zhong, 2014, p. 168). This suggests that online social interactions may not serve as effective substitutes for offline interactions. It can be argued that increased awareness and sensitivity toward digital addiction may reduce loneliness levels and improve communication skills (Sezgin et al., 2019). University students, who represent the young and dynamic segment of society, are particularly included in this group.

On the other hand, the results indicate that the time spent playing digital games mediates the relationship between social and emotional loneliness and digital game addiction. Social and emotional loneliness significantly and positively predict digital game playing time, indicating that university students experiencing loneliness tend to play digital games more to reduce feelings of isolation and establish social connections. As the time university students spend in digital environments increases, they face a higher risk of digital game addiction.

In light of these discussions and findings, university students should put more effort into addressing their loneliness and using their time actively and productively. Considering that digital games disrupt daily functioning and efficient time use, digital game addiction should be given greater attention by students, educators, and policymakers. Particularly, policymakers and educators can implement appropriate interventions to ensure effective use of digital technologies in the learning process and minimize their negative effects on students. Moreover, increasing the number of social spaces where children and young people can engage in face-to-face communication, sports facilities, art and cultural centers, volunteer activity platforms, and clubs organizing events

is considered an important need to strengthen social bonds and prevent tendencies toward digital games.

In conclusion, the data for this study were obtained only from university students in a collectivist culture. Cultural and contextual differences may influence the dynamics of digital game addiction. Therefore, future studies should validate our findings with different sample groups. Research conducted in different regions and among various segments of society is also important for comparative purposes. Studies with larger samples will facilitate the generalization of the results obtained. The findings presented here allow for inferences regarding the impact of loneliness on digital game addiction. Additionally, longitudinal studies examining the relationship between parental loneliness and young people's digital game addiction can be designed. Whether boredom mediates the effect of loneliness on digital game addiction remains an unanswered question warranting further research.

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