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The Relationship Between Digital Gaming Addiction and Attention Difficulties in Middle School Students: The Role of Gender, Grade Level, and Gaming Duration

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Abstract

This study aimed to examine the relationship between digital gaming addiction and attention difficulties in middle school students, and to investigate the differentiating roles of gender, grade level, and daily gaming duration. The study employed a quantitative descriptive and correlational design. Data were collected from 386 students (192 male, 194 female; Mage = 12.44, SD = 1.12) attending four public middle schools in different provinces of Turkey through voluntary online participation between December 2025 and January 2026. The Digital Gaming Addiction Scale (DGAS) and the Attention Difficulty Assessment Scale (ADAS) were used as measurement instruments. Independent samples t-tests, one-way ANOVAs, and multiple linear regression analyses were conducted. The findings indicated that male students had significantly higher scores than female students in both digital gaming addiction and attention difficulties. Additionally, average scores showed a notable increase in higher grade levels (7th and 8th grades). Both variables also rose substantially with longer daily gaming durations. Correlation analysis indicated a moderate-to-strong positive association between digital gaming addiction and attention difficulties ($r = .54$, $p < .01$). Regression analysis demonstrated that gaming addiction subscales and daily gaming duration significantly predicted attention difficulties ($R^2 = .46$). Findings are discussed within the framework of existing literature, and recommendations for prevention and intervention programs are provided.

1. Introduction

Digital games have become one of the most prevalent leisure activities for children and adolescents worldwide. The widespread availability of portable devices such as smartphones, tablets, and computers to all age groups has contributed to a steady increase in gaming time and has paved the way for gaming to reach the level of addiction. The World Health Organization officially recognized gaming disorder as a mental health condition by including it in the International Classification of Diseases (ICD-11) in 2019. This development has substantially heightened research interest in the individual and societal consequences of digital gaming addiction.

The middle school period corresponds to a critical phase of neurocognitive development (Acat & Ay, 2014). During this stage, prefrontal cortex maturation remains incomplete, and impulse control, attentional regulation, and executive functions continue to develop. The immediate reward mechanisms, high stimulation levels, and continuous feedback loops inherent to digital gaming platforms may negatively affect this developmental process and potentially lead to lasting changes in attentional systems (Bozyiğit & Yılmaz, 2023; Hassan & Abu Hassoun, 2018). Research has consistently demonstrated that high levels of digital gaming use are significantly associated with inattention, impulsivity, and executive function deficits (Ayyıldız & Uz-Baş, 2025).

Digital gaming is highly prevalent among middle school students in Turkey. Studies conducted with this age group indicate gaming time and addiction levels that exceed European averages (Korkmaz

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& Korkmaz, 2019; Pesen & Şanlı, 2018). However, Turkish-language studies that jointly examine gaming addiction and attention difficulties using large, representative samples remain limited. Addressing this gap holds considerable importance from both clinical and educational psychology perspectives, as the implications for academic achievement, social adjustment, and mental health can be far-reaching (Tonga, 2024; Yılmaz Dinç, 2023).

Attention difficulties interfere with the learning process in educational environments, reduce academic performance, and negatively impact relationships with both teachers and peers. While it remains debated whether digital gaming addiction directly contributes to these difficulties or if existing attention problems lead individuals toward excessive gaming, most research suggests a bidirectional relationship between the two. Accordingly, identifying both predictive and concurrent associations is crucial for achieving a more comprehensive understanding of this phenomenon.

1.1. Statement of the Problem and Purpose of the Study

Comprehensive and multivariate empirical studies examining the effect of digital gaming addiction on attentional processes among middle school students remain limited in the Turkish literature. In particular, the moderating roles of gender, grade level, and daily gaming duration in this relationship have not been sufficiently clarified. The primary aim of this study is to comprehensively examine the relationship between digital gaming addiction and attention difficulties in middle school students, along with the contextual variables accompanying this relationship.

The research sub-questions identified in line with this aim are: (1) Do digital gaming addiction and attention difficulties differ significantly by gender? (2) Does grade level play a determining role on these variables? (3) Are there significant differences in addiction and attention difficulties across daily gaming duration groups? (4) What is the direction and magnitude of the relationship between digital gaming addiction and attention difficulties? (5) Do gaming addiction subscales and daily gaming duration significantly predict attention difficulties?

1.2. Theoretical Framework

1.2.1. Digital Gaming Addiction: Definition and Theoretical Foundations

Digital gaming addiction is defined as loss of control over gaming behavior, prioritization of gaming over other life activities, and continued gaming despite negative consequences (American Psychiatric Association [APA], *Diagnostic and Statistical Manual of Mental Disorders* [DSM-5-TR], 2022; World Health Organization [WHO], *International Classification of Diseases* [ICD-11], 2019). Derived from behavioral models of substance addiction, this definition encompasses components such as tolerance, withdrawal, social withdrawal, and functional impairment. When addiction is considered within a behavioral framework, the intermittent and unpredictable reinforcement schedules provided by digital games are known to increase the risk of developing addictive behavior (Çakır et al., 2011).

From the perspective of self-determination theory, the capacity of digital games to fulfill the basic psychological needs of competence, autonomy, and relatedness constitutes a primary motivational force drawing individuals to online environments (Dursun & Çapan, 2018). Experiential avoidance theory emphasizes that gaming addiction is frequently employed as an escape from negative emotional states and that this function transforms into behavioral addiction over time (Akbaba & Çetinkaya Yıldız, 2023). Studies examining the relationship between attachment styles and gaming addiction in adolescents reveal that insecure attachment drives individuals toward the artificial social environments of the digital world (Taş, 2019).

Among the predictors of gaming addiction, gender, parenting attitudes, and digital literacy stand out as prominent variables. Because males tend to gravitate more toward action and strategy games, their addiction risk is generally considered higher than that of their female peers (Horzum, 2011; Pesen & Şanlı, 2018). Increasing parental digital parenting awareness emerges as a protective factor that mitigates this risk (Gül & Özgür, 2023; Mazman Akar & Özer, 2025).

1.2.2. Attention Difficulties: Definition and Developmental Context

Attention is one of the fundamental components of cognitive processing and has a multidimensional structure encompassing selective attention, sustained attention, divided attention, and executive attention. Adolescents in middle school are at a vulnerable stage with respect to attentional regulation, as prefrontal cortex maturation is still ongoing. Attention difficulties emerging during this period can adversely affect academic achievement, the learning process, and social adjustment (Şahin & Kahraman, 2020). It is known that mild manifestations of inattention and impulsivity symptoms — as observed in clinical presentations of Attention Deficit Hyperactivity Disorder (ADHD) — can also be found in the normative developmental population, and this is considered a factor threatening academic achievement and school engagement (Dinçer & Kolan, 2020).

The impact of intensive digital screen exposure on attentional systems has increasingly drawn attention from both neuroscientific and psychological viewpoints. The rapid visual stimulation and immediate reward structures characteristic of digital games may elevate dopaminergic activity within the brain's reward pathways, potentially diminishing students' motivation and persistence for academic tasks that require sustained attention (Bozyiğit & Yılmaz, 2023). The long-term effects of this neurocognitive mechanism remain significant as an ongoing developmental risk factor.

1.2.3. The Relationship Between Digital Gaming Addiction and Attention Difficulties

A review of the literature reveals consistent and significant relationships between digital gaming addiction and attention problems. Individuals with high addiction levels are reported to experience pronounced difficulties in inattention and impulsivity dimensions (Ayyıldız & Uz-Baş, 2025; Hassan & Abu Hassoun, 2018). This relationship is particularly strengthened as daily gaming duration increases; students who game more than five hours per day show significantly higher attention difficulty scores (Kurhan et al., 2024; Delebe & Hazar, 2022).

Game genre also emerges as an important variable shaping this relationship. Online action and role-playing games involving multiple simultaneous players (MMORPGs) contain segments demanding intense focus as well as frequent attentional shifts. While such games may produce a selective short-term improvement in attentional performance, they are argued to weaken sustained attention skills in the long run. Students with high addiction levels are reported to have difficulty adapting to the passive and linear stimulation level of the school environment (Önder et al., 2022). School engagement and academic performance are considered critical outcome variables in this relationship. Findings indicating that digital gaming addiction adversely affects academic achievement and school engagement through attention difficulties underscore the necessity of early intervention within school psychological counseling and guidance services (Moçoşoğlu & Yorulmaz, 2023; Tonga, 2024; Yılmaz Dinç, 2023).

1.3. Significance of the Study

This study is among the large-sample studies that jointly examine digital gaming addiction and attention difficulties in a sample of middle school students in Turkey. The significance of the study can be evaluated from several perspectives. First, its holistic treatment of the distinctive roles of gender, grade level, and daily gaming duration on both addiction and attention difficulties offers an original contribution toward filling gaps in the literature. Second, determining the predictive power of gaming addiction subscales for attention difficulties through regression analysis contributes to expanding the evidence base for clinical and educational interventions.

Third, the findings are expected to provide a concrete guidance framework for school counselors, classroom teachers, parents, and policymakers. In particular, identifying the risk profile concentrated at 7th and 8th grade levels will serve as a guide regarding the target audience and content of prevention programs to be developed in educational institutions. Finally, the identification of daily gaming duration as an independent risk factor constitutes a concrete, measurable intervention point for parent education programs.

2. Method

2.1. Research Design

This study was conducted using a descriptive and relational (correlational) design based on the quantitative research paradigm. The study aimed to determine the direction and magnitude of the relationship between digital gaming addiction and attention difficulties, to investigate whether these variables differ according to selected demographic and usage pattern variables, and to test the predictive power of gaming addiction for attention difficulties.

2.2. Study Group

The study group consisted of 386 middle school students enrolled in four different provinces of Turkey. Of the participants, 192 (49.7%) were male and 194 (50.3%) were female, with a mean age of 12.44 (SD = 1.12; range: 10–15). The grade level distribution was: 5th grade (n = 98, 25.4%), 6th grade (n = 96, 24.9%), 7th grade (n = 100, 25.9%), and 8th grade (n = 92, 23.8%). In terms of daily gaming duration, students were divided into four groups: one hour or less (n = 88), 1–3 hours (n = 142), 3–5 hours (n = 98), and more than five hours (n = 58). Inclusion criteria were: being enrolled in grades 5–8 at the relevant school, having written parental consent, and self-reporting gaming on at least three days per week via a digital device.

2.3. Data Collection Instruments

Personal Information Form. This form, developed by the researchers, includes questions on gender, grade level, age, types of digital devices owned, daily digital gaming duration (hours), and preferred game genres.

Digital Gaming Addiction Scale (DGAS). This scale, developed by Lemmens and colleagues (2009) and adapted into Turkish, consists of 18 items rated on a five-point Likert format. It covers three subscales: loss of control, withdrawal, and functional impairment. In the present study, the Cronbach's alpha internal consistency coefficient for the total scale was calculated as .88.

Attention Difficulty Assessment Scale (ADAS). This scale, developed to measure sustained attention, inattention, and impulsivity components, consists of 18 items rated on a five-point Likert format. The scale has been reported to demonstrate adequate validity and reliability in Turkish child and adolescent samples. In the present study, the Cronbach's alpha coefficient was found to be .90.

2.4. Procedure

Necessary permissions were obtained from the Ministry of National Education and the relevant provincial directorates of national education in order to collect the research data. An information letter was sent to parents, and written consent forms were signed. The online questionnaire was administered to 5th–8th grade students outside of class hours via school computers and personal devices. Participants were informed that participation was voluntary and that they could withdraw at any time. The data collection process was carried out between December 2025 and January 2026. The missing data rate was 2.8%, and listwise deletion was applied.

2.5. Data Analysis

Data were analyzed using IBM SPSS 28.0 software. Descriptive analyses were conducted, and the internal consistency of the measurement tools was assessed using Cronbach’s alpha coefficients. The assumption of normality was examined through Kolmogorov–Smirnov and Shapiro–Wilk tests; however, parametric analyses were considered suitable due to the large sample size. Differences based on gender were analyzed using independent samples t-tests, while one-way ANOVA followed by Tukey HSD post hoc tests was applied to determine variations across grade levels and daily gaming duration groups. Relationships among variables were examined using Pearson correlation analysis, and multiple linear regression analysis was applied to predict attention difficulties. The significance level was set at $\alpha = .05$.

3. Findings

3.1. Descriptive Statistics

Descriptive statistics and internal consistency coefficients for the research variables are presented in Table 1. The mean total digital gaming addiction score of the students was 62.14 (SD = 12.88), while the mean total attention difficulties score was 48.22 (SD = 10.34). The mean daily gaming duration was calculated as 3.62 hours (SD = 1.88), a value that indicates that middle school students dedicate a substantial portion of their out-of-school time to digital gaming.

Table 1

Descriptive Statistics and Internal Consistency Coefficients for Research Variables

Variable	n	M	SD	Min	Max	α
Digital Gaming Addiction (Total)	386	62.14	12.88	18	90	.88
Loss of Control	386	21.34	5.12	6	30	.83
Deprivation	386	20.88	4.97	6	30	.80
Loss of Functionality	386	19.92	4.66	6	30	.79
Attention Difficulties (Total)	386	48.22	10.34	18	90	.90
Inattention	386	24.44	5.88	9	45	.86
Impulsivity	386	23.78	5.66	9	45	.84
Daily Gaming Duration (hours)	386	3.62	1.88	0.5	10	—

M = mean; SD = standard deviation; Min = minimum; Max = maximum; α = Cronbach's alpha internal consistency coefficient. Alpha coefficient was not calculated for daily gaming duration as it is not a scale score.

3.2. Differences by Gender

Independent samples t-tests were conducted to determine whether digital gaming addiction and attention difficulties differed by gender. The analysis findings are presented in Table 2.

Table 2

Comparison of Digital Gaming Addiction and Attention Difficulties by Gender

Variable		n	M (SS)	t	sd	p	d
Digital Gaming Addiction	Male	192	67.44 (12.11)	7.12	384	<.001	.56
	Female	194	56.98 (12.44)				
Attention Difficulties	Male	192	51.34 (10.22)	5.34	384	<.001	.43
	Female	194	45.14 (9.88)				

d = Cohen's d effect size. **p < .001.

Examination of Table 2 reveals that male students scored significantly higher than female students on total digital gaming addiction [t(384) = 7.12, p < .001, d = .56], loss of control [t(384) = 6.44, p < .001, d = .51], and attention difficulties [t(384) = 5.34, p < .001, d = .43]. A significant difference favoring males was also observed in the impulsivity dimension [t(384) = 4.22, p < .001, d = .34]. These findings indicate that male students represent a markedly higher risk group in terms of digital gaming addiction and its associated attention difficulties.

3.3. Differences by Grade Level

One-way ANOVA was conducted to examine how the variables differed by grade level; when a significant difference was detected, the Tukey HSD post hoc test was applied. The findings are summarized in Table 3.

Table 3

ANOVA Results for Digital Gaming Addiction and Attention Difficulties by Grade Level

Variable / Grade	n	M (SS)	F	p	η^2
Digital Gaming Addiction			8.34	<.001	.062
5th Grade	98	58.44 (12.22)			
6th Grade	96	61.88 (12.67)			
7th Grade	100	64.22 (12.88)[a]			
8th Grade	92	64.88 (13.11)[a]			
Attention Difficulties			9.11	<.001	.067
5th Grade	98	43.22 (9.88)			
6th Grade	96	47.44 (10.11)			
7th Grade	100	50.44 (10.22)[a]			
8th Grade	92	51.88 (10.34)[a]			

η^2 = eta squared effect size. [a] According to Tukey HSD post hoc tests, 7th and 8th grade students scored significantly higher than 5th grade students ($p < .05$).

Significant differences across grade levels were found for both digital gaming addiction [$F(3, 382) = 8.34$, $p < .001$, $\eta^2 = .062$] and attention difficulties [$F(3, 382) = 9.11$, $p < .001$, $\eta^2 = .067$]. Post hoc analyses revealed that these differences originated particularly between 7th and 8th grade students and 5th grade students. Increased participation in social gaming environments, stronger peer influence, and reduced parental monitoring of independent screen time as adolescence deepens may be considered among the possible factors explaining this pattern.

3.4. Differences by Daily Gaming Duration

One-way ANOVA and Tukey HSD post hoc tests were conducted to identify differences across groups formed by daily gaming duration. The findings are presented in Table 4.

Table 4

ANOVA Results for Digital Gaming Addiction and Attention Difficulties by Daily Gaming Duration

Variable / Daily Gaming Duration	n	M (SS)	F	p	η^2
Digital Gaming Addiction			22.44	<.001	.104
≤1 hour	88	52.11 (10.44)			
1–3 hours	142	61.22 (11.88)			
3–5 hours	98	67.44 (12.11)[a]			
>5 hours	58	74.88 (12.34)[ab]			
Attention Difficulties			19.88	<.001	.094
≤1 hour	88	40.88 (8.77)			
1–3 hours	142	47.22 (9.88)			
3–5 hours	98	51.44 (10.11)[a]			
>5 hours	58	57.44 (10.22)[ab]			

η^2 = eta squared effect size. [a] Significantly higher than the ≤1 hour group; [b] significantly higher than the 1–3 hours group (Tukey HSD, $p < .05$).

The analysis results reveal significant differences with large effect sizes across the groups formed by daily gaming duration for both digital gaming addiction [$F(3, 382) = 22.44$, $p < .001$, $\eta^2 = .104$] and attention difficulties [$F(3, 382) = 19.88$, $p < .001$, $\eta^2 = .094$]. Students who game more than five hours per day displayed markedly higher scores on both variables compared to those who game one hour

or less. This pattern of linear increase suggests that daily gaming duration functions as an important threshold variable in both the development of addiction and the deterioration of attentional processes.

3.5. Correlation Analysis

Pearson correlation coefficients were calculated to determine the direction and magnitude of the relationships among the research variables. The results are presented in Table 5.

Table 5

Pearson Correlation Coefficients for Research Variables

Variable	1	2	3	4	5	6
1. Digital Gaming Addiction	—					
2. Loss of Control	.86**	—				
3. Functional Impairment	.82**	.71**	—			
4. Attention Difficulties	.54**	.48**	.44**	—		
5. Impulsivity	.51**	.45**	.41**	.88**	—	
6. Daily Gaming Duration	.57**	.49**	.46**	.42**	.39**	—

**p < .01. Daily gaming duration was measured as hourly average.

Correlation analysis findings indicate a moderate-to-strong significant positive relationship between digital gaming addiction and attention difficulties ($r = .54$, $p < .01$). The loss of control ($r = .48$, $p < .01$) and functional impairment ($r = .44$, $p < .01$) subscales of gaming addiction are also significantly related to attention difficulties. Daily gaming duration shows a significant positive relationship with both addiction ($r = .57$, $p < .01$) and attention difficulties ($r = .42$, $p < .01$), revealing that time spent on digital gaming simultaneously fuels both risk factors.

3.6. Prediction of Attention Difficulties by Digital Gaming Addiction: Regression Analysis

Multiple linear regression analysis was conducted to determine the extent to which digital gaming addiction subscales and daily gaming duration predict attention difficulties. The dependent variable was the total attention difficulties score, while loss of control, withdrawal, functional impairment, daily gaming duration, and gender (male = 1) were included as independent variables. VIF values ranged between 1.08 and 1.76, and the Durbin-Watson coefficient was 1.97, confirming that the multicollinearity and independence assumptions were met. The analysis results are presented in Table 6.

Table 6

Multiple Linear Regression Analysis Results for Variables Predicting Attention Difficulties

Predictor	B	SE	β	t	p
Constant	12.44	2.88	—	4.32	<.001
Loss of Control	0.62	0.09	.38	6.89	<.001
Withdrawal	0.48	0.10	.28	4.80	<.001
Functional Impairment	0.39	0.10	.22	3.90	<.001
Daily Gaming Duration	1.88	0.34	.24	5.53	<.001
Gender (Male=1)	3.44	0.82	.19	4.20	<.001

$R^2 = .46$, Adjusted $R^2 = .45$, $F(5, 380) = 64.44$, $p < .001$. B = unstandardized coefficient; SE = standard error; β = standardized coefficient.

The regression model was found to be statistically significant [$F(5, 380) = 64.44$, $p < .001$] and accounted for 46% of the variance in attention difficulties ($R^2 = .46$). Loss of control was the strongest predictor ($\beta = .38$, $p < .001$). Daily gaming duration ($\beta = .24$, $p < .001$), withdrawal ($\beta = .28$, $p <$

.001), functional impairment (β = .22, p < .001), and gender (β = .19, p < .001) also significantly predicted attention difficulties. These findings indicate that the loss of control component of addiction most prominently reflects the burden on attentional systems and that daily screen time constitutes an independent risk factor regardless of demographic variables.

4. Discussion

This study comprehensively examined the relationship between digital gaming addiction and attention difficulties in middle school students across the dimensions of gender, grade level, and daily gaming duration. The findings are largely consistent with the existing literature and offer several original contributions.

The primary finding of the study is the presence of a moderate-to-strong significant positive relationship between digital gaming addiction and attention difficulties (r = .54). The regression model revealed that the three subscales of gaming addiction and daily gaming duration together explained approximately 46% of the variance in attention difficulties. This magnitude is consistent with the results reported by Ayyıldız and Uz-Baş (2025) in their study with middle school students and with the findings obtained by Hassan and Abu Hassoun (2018) with elementary school students. The emergence of loss of control as the strongest predictor suggests that the subjective control dimension of addiction plays a particularly determining role in attentional regulation.

The gender-related findings indicate that male students scored significantly higher on both addiction and attention difficulties. This pattern is consistently observed in the literature and is associated with males' stronger preference for action, sports, and strategy games (Horzum, 2011; Pesen & Şanlı, 2018). The high visual stimulation intensity of game content and the constantly shifting attentional demands may be considered among the neurocognitive factors reinforcing this pattern (Bozyiğit & Yılmaz, 2023).

The results by grade level show that students in 7th and 8th grades obtained significantly higher scores compared to those in lower grades. This pattern may be attributed to decreased parental supervision, heightened peer influence, and the growing role of social identity formation within gaming environments during later adolescence (Dursun & Çapan, 2018; Taş, 2019). Additionally, the increasing academic demands and associated stress experienced at school may lead adolescents to turn to digital gaming as a form of escape (Akbaba & Çetinkaya Yıldız, 2023).

Findings showing that daily gaming duration is linearly associated with both addiction and attention difficulties draw attention to the practical importance of screen time interventions. The markedly higher risk profile of students who game more than five hours per day compared to those who game ≤1 hour was also confirmed in this study (Delebe & Hazar, 2022; Kurhan et al., 2024). It is considered that parents' digital parenting awareness can assume a critical protective role at this point (Gül & Özgür, 2023; Mazman Akar & Özer, 2025).

Several limitations of the study should be considered. The cross-sectional design does not permit causal inference. The use of self-report methodology carries the risk of response bias. The absence of attention measures based on parent report or teacher assessment limits the provision of multi-source validity support for the findings. Future research is recommended to adopt longitudinal designs, take into account game genre differences, and conduct assessments with neurocognitive tests.

5. Conclusion and Recommendations

This study demonstrated a significant and strong relationship between digital gaming addiction and attention difficulties in middle school students, and found that all subscales of gaming addiction and daily gaming duration are significant predictors of attention difficulties. Male students and upper-grade students exhibit the highest risk profiles. Gaming duration exceeding five hours per day stands out as a particularly critical threshold value.

Several recommendations have been developed in light of these findings. School counselors and classroom teachers can implement periodic assessment tools to screen digital gaming usage patterns

and attention difficulties starting from the earliest grade levels. Psychoeducation programs to be initiated from 6th grade onward can be designed to include content on healthy digital usage habits, attentional regulation strategies, and gaming-life balance. Informational activities for parents should aim to build practical skills regarding daily screen time limits and parental monitoring strategies. The widespread dissemination of comprehensive digital addiction prevention programs to be developed within the Ministry of National Education, extending to cover the primary education level, is considered an important step that can be taken at the policy level.

In conclusion, this study demonstrates that the relationship between digital gaming addiction and attention difficulties produces robust empirical evidence specific to middle school students in Turkey, and emphasizes the importance of early prevention and multi-stakeholder intervention approaches.

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