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Electronic gaming addiction among adolescents: A predictive structural analysis of demographic and behavioral factors

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ABSTRACT

Background: The growing engagement of adolescents with electronic games has raised concerns about gaming addiction. Understanding how behavioral and demographic factors contribute to this phenomenon is crucial, especially concerning game type, play mode, and daily usage.

Objectives: This study aimed to investigate the impact of game type, play mode (online/offline), gameplay hours, birth order, gender, and parental education level on electronic gaming addiction among adolescents.

Methods: A non-experimental quantitative design using a descriptive-analytical approach was adopted. The sample consisted of 312 adolescents selected via stratified random sampling. The Game Addiction Scale for Adolescents was utilized, and data were analyzed using Multivariate Analysis of Variance (MANOVA) and Structural Equation Modeling (SEM).

Results: Gameplay hours and game type—particularly combat games—emerged as the strongest predictors of gaming addiction. Play mode had no significant effect. Males exhibited higher levels of addiction than females. Higher maternal education was associated with lower addiction scores. Academic achievement did not mediate the relationship between parental education and addiction.

Conclusion: The findings underscore the need for preventive psychological and educational programs targeting screen time and gaming content. Future studies should explore emotional, social, and neurocognitive variables to enhance the understanding of digital addiction mechanisms.

KEYWORDS: electronic gaming addiction, game type, gameplay hours, parental education, structural equation modeling

Introduction

Internet gaming addiction is a growing concern characterized by excessive gaming that interferes with daily functioning. It has been recognized as a mental disorder by the World Health Organization (Yue, 2024). Research indicates that a minority of players experience symptoms similar to substance-related addictions, including mood modification and tolerance. The addiction follows a continuum from etiology to development and consequences. Neuroimaging studies suggest similarities with other addictions at molecular, neurocircuitry, and behavioral levels (Sywelem & Alotaibi, 2025). Video gaming is a popular leisure activity among adolescents. Those who play excessively are in danger of educational and social drawbacks and may become addicted to video gaming (Alfaleh et al., 2024). With the advent of new technologies and the increasing development of the Internet, we have gradually witnessed the emergence of a new mode of communication through the use of smartphones, tablets, personal computers, and the Internet, replacing direct contact with people and creating new patterns of increasingly lonely and sedentary lifestyles (Griffiths, 2012). Internet use has increased with the increase in the popularity of social media platforms and the boom in online gaming, which has led to an increase in the amount of time people spend online(Abdel-Salam et al., 2019).

Electronic gaming addiction among adolescents is a growing concern, characterized by symptoms similar to substance addiction(Kuss & Griffiths, 2012). It involves excessive time spent on gaming, loss of interest in other activities, and psychological distress when unable to play (Erdoğan, 2016). Studies indicate that approximately 20% of adolescents may be "dependent" on computer games, with boys more likely to exhibit this. Early exposure to gaming is associated with a higher likelihood of developing addiction (Akçakese & Demirel, 2025) While not yet officially recognized as a psychiatric disorder, the increasing prevalence and associated problems have led to growing research interest, Some researchers conceptualize problematic online gaming as a behavioral addiction rather than an impulse control disorder(Karaca et al., 2025) Assessment tools, such as the Game Addiction Scale for Adolescents (GASA), are being used to identify gaming addiction in adolescent populations

Recent research highlights the multifaceted nature of electronic gaming addiction among adolescents. Psychological predictors include sensation seeking, social anxiety, and low self-esteem (Wu et al., 2016) Social influences, such as peer pressure and family dynamics, play crucial roles in shaping gaming behaviors (Juthamanee & Gunawan, 2021) Gender differences exist, with males more prone to gaming addiction and females to social media addiction (Giordano et al., 2023). The 11th revision of the International Classification of Diseases (ICD-11), which was released by the World Health Organization (WHO) and the American Psychiatric Association (APA) defines GD as video gaming with the following behaviors: 1) impaired control over gaming (e.g., onset, frequency, intensity, duration, and termination); 2) increasing priority given to gaming to the point where gaming takes precedence over other life interests and daily activities, and 3) continuation of gaming despite the occurrence of negative consequences. These three points are the main diagnostic criteria for GD (Andrade & Galvão, 2025; Organization, 2020) GD diagnosis is based on the presence of five or more of the following nine conditions within 12 months: preoccupation, withdrawal, tolerance, loss of control, giving up other activities, continuing despite problems, deception, escaping adverse mood, and relationship loss (Király et al., 2015). Video gaming has been one of the most popular leisure activities in all generations since Atari introduced Pong in 1972, the first successful commercial video game. The proliferation of gaming platforms—computers, consoles, and smartphones—has facilitated widespread access to video games, boosting the popularity of video gaming. A recent study indicates that over 3 billion people play video games. Adolescents aged eight to eighteen are particularly vulnerable to game addiction. In the United States, over 90 % of children regularly play video games, with 8.5 % of them experiencing addiction (Brailovskaia et al., 2019)

The study (Sywelem & Alotaibi, 2025) results showed that among a sample of 245 parents in Jazan, Saudi Arabia, there was high and consistent awareness of the health, behavioral, and academic risks of gaming addiction, with no significant differences by gender, education, residence, or income. The study (Raccio et al., 2025) showed that, among 1,586 Italian students aged 10–25 years, 29.8% played video games for more than 3 hours a day and 32.9% for over 12 hours a week, with longer playtimes reported in Central Italy compared to the North. Many indicated negative effects on interest in school, engagement, and academic performance, while the majority valued gaming as a means of entertainment, social interaction, and performance improvement. The study showed (Alfaleh et al., 2024) that, among 5,332 Saudi students (mean age 15.5 years), 39.1% were

normal gamers, 40.5% risky gamers, and 20.5% had gaming disorder. GD was significantly associated with using tablets, consoles, or PCs, having multiple devices, and playing online, fighting, racing, war, and adventure games.

In Saudi Arabia, Rajab et al. (2020) conducted a study aimed at uncovering the prevalence of video gaming addiction among adolescents. Their investigation revealed higher addiction rates, particularly among males. The findings also showed that paternal education level and parental attitudes toward gaming significantly influenced the likelihood of addiction, while gaming addiction was associated with increased psychological stress in adolescents.

A predictive study (Abolfotouh & Barnawi, 2024) investigated various demographic factors and discovered that male adolescents and those with strong academic performance were more prone to developing gaming addiction, especially when their parents held higher educational status and supported gaming activities. However, regular physical activity and strong family interaction contributed to a reduction in addictive behaviors. In China, Huamani-Cahua et al. (2025) examined a structural analysis of the psychological impacts of gaming addiction and concluded that state anxiety acts as a mediator between behavioral adaptation and addiction, intensifying the addictive behavior among adolescents. A comprehensive systematic review addressed the complex interplay of demographic and behavioral factors, confirming that the risk of gaming addiction increases with age and is higher among males (Juthamanee & Gunawan, 2021) A symptom network analysis further highlighted the correlation between internet gaming addiction and multiple psychological symptoms such as depression and anxiety, showing considerable variation across age and gender groups(Xie & Tang, 2024) Similarly, a structural equation modeling study found(Kaya & Pazarcıkcı, 2023) that behaviors such as prolonged gaming, peer influence, and personality traits are strong predictors of gaming addiction, indicating the need to focus on modifying family and school environments to provide healthier social support systems. In South Korea, research demonstrated that early initiation into electronic gaming leads to a higher risk of addiction in adolescents. A global systematic review reported that the prevalence of gaming disorder among adolescents ranges from 1.9% to 5.9%, with higher rates observed in Asian countries. The influence of social and economic factors, family engagement, and caretaker involvement was evident in determining prevalence rates (Rosales-Navarro & Torres Pérez, 2025) (Young, 2009) study found that thrill-seeking peer pressure, low self-esteem, and emotional dysregulation are directly linked to addictive gaming behaviors, highlighting that comprehensive interventions encompassing family, peers, and psychological skills are most effective.

The studies collectively showed notable variation in gaming disorder prevalence among adolescents across different contexts. IGD prevalence was 5.6%, sharply increasing with age and academic stage. In Saudi Arabia, one study reported 20.45% meeting gaming disorder criteria, with risk higher among those using multiple devices. At the same time, another found 8.3% addicted gamers, 33.4% problem gamers, and 2.2% highly engaged, with higher likelihood among males and high-achieving students. A large-scale vocational school study reported a 41.5% addiction rate, significantly linked to cyberbullying and extended playtime (4+ hours/day). Globally, a meta-analysis estimated adolescent gaming disorder prevalence at 8.6%, with marked cross-country differences reflecting environmental and cultural factors. Together, these findings highlight the substantial and context-dependent burden of gaming disorder in adolescents and underscore the influence of demographic, behavioral, and cultural variables on its prevalence (Abolfotouh & Barnawi, 2024; Alfaleh et al., 2024; Ayaz-Alkaya & Köse-Kabakcıoğlu, 2025; Fard et al., 2025; Satapathy et al., 2025). These studies reveal a progressive path of exploration into the intertwined demographic and behavioral predictors of electronic gaming addiction among adolescents, endorsing the need for integrated and multifaceted intervention programs. Despite the growing body of research on digital game addiction, most existing studies have focused on samples outside the Saudi cultural context or examined a limited set of variables without integrating demographic and behavioral factors into a comprehensive explanatory model. Furthermore, previous research has often relied on traditional analytical methods and has not employed advanced statistical models to uncover both direct and indirect relationships among variables. This highlights a research gap in the need for a study that combines the demographic and behavioral characteristics of Saudi gamers while utilizing modern analytical approaches to identify the most influential factors in digital game addiction, thereby enriching theoretical knowledge and informing preventive interventions.

Methodology

Study Design

This study employed a non-experimental quantitative design using a descriptive-analytical approach to examine the associations between game type, play mode, hours of use, parental education, gender, and birth order with levels of electronic gaming addiction. The design was strengthened through Structural Equation Modeling (SEM) and Multivariate Analysis of Variance (MANOVA) to explore causal links and statistically significant differences among variables.

Participants

The study sample comprised 312 adolescents selected through stratified random sampling from various secondary schools representing diverse geographical, social, and educational contexts. The data were collected electronically via a structured Google Form after obtaining ethical approval from the relevant institutional review board. The first page of the questionnaire included clear response instructions, emphasized the importance of accurate participation, and explained the principle of informed consent to the target population.

Participants were required to meet specific inclusion criteria: they had to be currently enrolled in secondary school, possess an electronic gaming device (such as a Sony PlayStation), actively engage in electronic gaming across different genres, and express voluntary willingness to participate. Additional eligibility conditions included the ability to read and understand the questionnaire content independently and having parental permission when necessary.

Responses that were incomplete, inconsistent, or did not meet the inclusion criteria were excluded after a thorough screening process to ensure data quality and integrity. The final sample was balanced in terms of gender, academic track, birth order, parental education level, play mode, and daily hours of gameplay. This sample size and diversity support the statistical power and generalizability of the findings.

Table 1 Demographic and Behavioral Characteristics of the Sample (N = 312)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	153	49.0%
	Female	159	51.0%
Hours Played Daily	From 1 to < 3 hours	211	67.6%
	From > 3 to < 6 hours	57	18.3%
	More than 6 hours	44	14.1%
Type of Games	Educational	138	44.2%
	Entertainment	30	9.6%
	Combat	144	46.2%
Birth Order	First-born	76	24.4%
	Middle child	159	51.0%
	Last-born	77	24.7%
Academic Major	Humanities	136	43.6%
	Scientific	112	35.9%
	Islamic Law	64	20.5%
Mother's Education Level	Diploma	97	31.1%
	Bachelor's degree	143	45.8%
	Postgraduate studies	72	23.1%
Father's Education Level	Diploma	122	39.1%
	Bachelor's degree	155	49.7%
	Postgraduate studies	35	11.2%
Mode of Play	Online	256	82.1%
	Offline	56	17.9%

Table 1 summarizes the demographic and behavioral characteristics of the study sample (N = 312 adolescents).

The gender distribution was balanced, with 49% male and 51% female participants, which supports the validity of gender-based comparisons. Regarding daily hours of gameplay, the majority (67.6%) reported playing between one and less than three hours per day, while 14.1% reported playing more than six hours, indicating a subgroup potentially at high risk for digital addiction.

In terms of game type, combat games were the most frequently played (46.2%), followed closely by educational games (44.2%), and entertainment games (9.6%). This pattern highlights a clear preference for competitive or action-oriented content among adolescents. Birth order distribution showed that middle children constituted the largest subgroup (51%), a demographic often associated with distinct emotional and social traits in developmental literature.

The academic major variable revealed a diverse educational background, with 43.6% in humanities, 35.9% in scientific tracks, and 20.5% in Islamic law studies—offering a basis for exploring cognitive or cultural differences in gaming behavior. Regarding parental education, the majority of both mothers and fathers held at least a bachelor's degree, with a significant proportion holding postgraduate degrees, providing a relevant socio-educational dimension to the analysis.

Finally, 82.1% of participants reported engaging in online gaming, underscoring the dominance of digital connectivity in adolescents' play habits and reinforcing the importance of studying addiction within a virtual context. These findings highlight the need for context-specific interventions and policies addressing digital engagement among youth.

Instruments

To achieve the objectives of the present study, the Game Addiction Scale for Adolescents developed by Lemmens et al. (2009) was employed. The scale is theoretically grounded in DSM-IV diagnostic criteria and designed to capture behavioral patterns associated with gaming addiction. It consists of 21 items distributed across seven key dimensions: salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems. Participants responded using a 5-point Likert scale reflecting frequency of experiences over the past six months.

The original version of the scale demonstrated strong psychometric properties. Confirmatory Factor Analysis (CFA) supported the construct validity, and Cronbach's alpha was 0.94 for the full scale, with subscale alphas ranging between 0.70 and 0.85.

To ensure cultural appropriateness, the scale was piloted on a sample of 60 adolescents from the target population. CFA results indicated an acceptable model fit (CFI = 0.94, RMSEA = 0.06), and Cronbach's alpha reached 0.91 for the full scale, with subscale values between 0.78 and 0.86. These findings confirm the scale's high reliability and validity and support its use in assessing gaming addiction among adolescents in the current Arabic context.

Statistical

Data were analyzed using the latest version of the JASP statistical software. A combination of descriptive and inferential statistical methods was applied, aligned with the study's objectives and research questions. Descriptive statistics included means, standard deviations, frequencies, and percentages to characterize the sample and summarize participants' responses across key study variables.

Inferential analysis involved Multivariate Analysis of Variance (MANOVA) to assess statistically significant differences in gaming addiction levels across demographic and behavioral variables. Furthermore, Structural Equation Modeling (SEM) was employed to evaluate the proposed model and identify potential causal relationships between independent variables and the dependent variable. Model fit indices such as RMSEA, CFI, and TLI were used to assess the adequacy of the structural model.

A significance level of ($\alpha \leq 0.05$) was adopted for all statistical tests, ensuring the robustness and reliability of the findings.

Results

1. **The effect of game mode (online/offline) and parental education level on the level and Gender of electronic gaming addiction.**

Table: MANOVA Results for Addiction Levels Based on Play Type, Parental Education, and Gender

Source	df	Approx. F	Pillai Trace	Num df	Den df	p-value
Type	2	4.945	0.234	16	596.000	< .001
Mother	2	2.051	0.104	16	596.000	0.009
Father	2	1.420	0.073	16	596.000	0.126
Gender	1	4.015	0.098	8	297.000	< .001

The MANOVA results reveal several important findings. First, the **type of play** (online vs. offline) significantly affects addiction levels ($p < .001$), indicating that the mode of play plays a crucial role in addiction. Further analysis is needed to explore which play type is more strongly associated with higher addiction levels.

Additionally, **mother's education** shows a significant effect on addiction levels ($p = 0.009$), suggesting that maternal education may influence addiction through socio-economic and parenting factors. In contrast, **father's education** did not significantly affect addiction ($p = 0.126$), indicating that paternal education may not be as influential in this context.

Regarding **gender**, results reveal that **males exhibit higher addiction levels compared to females** ($p < .001$), highlighting gender differences in addiction behavior, with males showing a higher susceptibility. Moreover, the analysis shows significant differences in addiction levels based on the **type of game usage**. **Addiction to combat and war games** was found to be the most prevalent, followed by **addiction to educational games** and **addiction to recreational games**. These findings suggest that violent and competitive games have a higher potential for addiction compared to educational and recreational games.

Finally, concerning **parental education levels,** the results indicate significant differences in addiction levels. **Individuals with parents holding a diploma** exhibit the highest addiction levels, followed by those with parents holding a bachelor's degree. **Those with parents who have graduate-level education** show the lowest levels of addiction, indicating that higher educational attainment may have a protective effect against addiction. In conclusion, the analysis underscores the significant roles of play type, maternal education, gender, parental education, and game genre in addiction. The lack of a significant effect for paternal education suggests the presence of more complex dynamics. Further post-hoc analyses are necessary to refine these findings and explore underlying mechanisms.

2. **The contribution of game type, hours of play, and the interaction between them in predicting levels of video game addiction among adolescents.**

Table 2: Model Summary – Addiction Scale

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	df1	df2	p
M_1	0.462	0.214	0.206	17.526	0.214	3	308	< .001

The Model Summary Table shows that the R^2 for model M_1 is 0.214, indicating that the model explains 21.4% of the variance in addiction scores. This suggests that the predictors included in the model (such as Hours of play and Type of play) contribute to explaining a portion of the variance in addiction behavior. The Adjusted R^2 of 0.206 further confirms that the model remains strong even after adjusting for the Number of predictors. Additionally, the RMSE value of 17.526 indicates that the model makes reasonably accurate predictions of addiction scores. Finally, the p-value for model M_1 is less than 0.001, confirming that the model is statistically significant.

Table 3: ANOVA – Addiction Scale

Model	Sum of Squares		df	Mean Square	F	p
M_1	Regression	25683.377	3	8561.126	27.872	
	Residual	94605.364	308	307.160		
	Total	120288.740	311			

The ANOVA Table indicates that the F-value for model M_1 is 27.872 with a p-value of < .001, suggesting that the model significantly explains the variance in addiction scores. A high F-value indicates that the predictors in the model (such as Hours, Type, and their interaction) have a substantial and meaningful effect on addiction behavior. The p-value of less than 0.001 further supports the statistical significance of the overall model.

Table 4: Coefficients – Addiction Scale

Model	Unstandardized	Standard Error	Standardized	t	p
	(Intercept)	28.685	5.226		5.489
	Type	1.764	2.355	0.085	0.749
M_1	Hours	9.943	3.323	0.369	2.992
	Type * Hours	0.710	1.431	0.084	0.497

In the Coefficients Table, the Intercept for M_0 is 48.971, and for M_1, it is 28.685, indicating a significant reduction in the baseline addiction score after including the predictors in the model. Type (online/offline) does not have a significant effect on addiction behavior (p = 0.455), suggesting that the type of play does not influence addiction levels. Hours has a significant effect on addiction scores (p = 0.003), indicating that more hours spent playing leads to higher addiction scores. The interaction between Type and Hours (p = 0.620) shows no significant effect on addiction, meaning that the relationship between hours of play and addiction is not influenced by whether the play is online or offline.
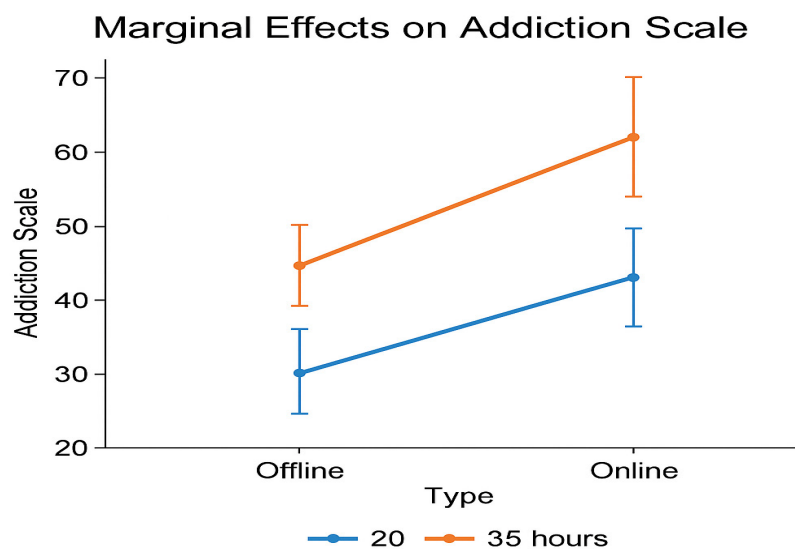
Figure 1: Marginal Effects on Addiction Scale

Here is the plot illustrating the marginal effects on the addiction scale, showing the influence of hours played (20 vs. 35 hours) and type of play (offline vs. online).

3. **The Proposed Causal Model of the Influence of Parental Education Level on Electronic Gaming Addiction Among Adolescents: The Mediating Role and Predictive Power of Academic Achievement**

Table 5: Parameter Estimates for Direct and Indirect Effects

Variable	Direct Effect Estimate	Std. Error	z-value	p	95% Confidence Interval
Mother → Addiction	-1.518	1.674	-0.906	0.365	[-4.800, 1.764]
Father → Addiction	-2.774	1.882	-1.474	0.140	[-6.461, 0.914]
Mother → Academic → Addiction	-0.197	0.213	-0.926	0.355	[-0.616, 0.221]
Father → Academic → Addiction	0.316	0.264	1.194	0.232	[-0.203, 0.834]

Direct Effects: There are no statistically significant direct effects between the mother's or father's education and addiction, as the p-values for both are greater than 0.05, indicating no significant relationship, Indirect Effects: The indirect effects of the mother's and father's education on addiction via academic achievement are also not statistically significant, as confidence intervals include zero and p-values are greater than 0.05.

Table 6: Total Effects

Variable	Estimate	Std. Error	z-value	p	95% Confidence Interval
Mother → Addiction	-1.715	1.682	-1.020	0.308	[-5.012, 1.582]
Father → Addiction	-2.458	1.887	-1.303	0.193	[-6.156, 1.240]

Total Effects: The total effects of both the mother's and father's education on addiction are also not statistically significant. The p-values (0.308 and 0.193) indicate no significant effect at the statistical significance level.

Table 7: Path Coefficients

Path	Estimate	Std. Error	z-value	p	95% Confidence Interval
Academic → Addiction	-2.866	1.435	-1.997	0.046	[-5.679, -0.053]
Mother → Addiction	-1.518	1.674	-0.906	0.365	[-4.800, 1.764]
Father → Addiction	-2.774	1.882	-1.474	0.140	[-6.461, 0.914]
Mother → Academic	0.069	0.066	1.045	0.296	[-0.060, 0.198]
Father → Academic	-0.110	0.074	-1.490	0.136	[-0.255, 0.035]

- o Academic → Addiction: There is a statistically significant effect between academic achievement and addiction (p-value = 0.046). This suggests that academic achievement has a significant negative effect on addiction.
- o Mother's and Father's Education → Addiction: There are no statistically significant effects of either the mother's or the father's education on addiction.
- o Mother's and Father's Education → Academic Achievement: There are no statistically significant effects of either the mother's or the father's education on academic achievement, as the p-values are greater than 0.05.
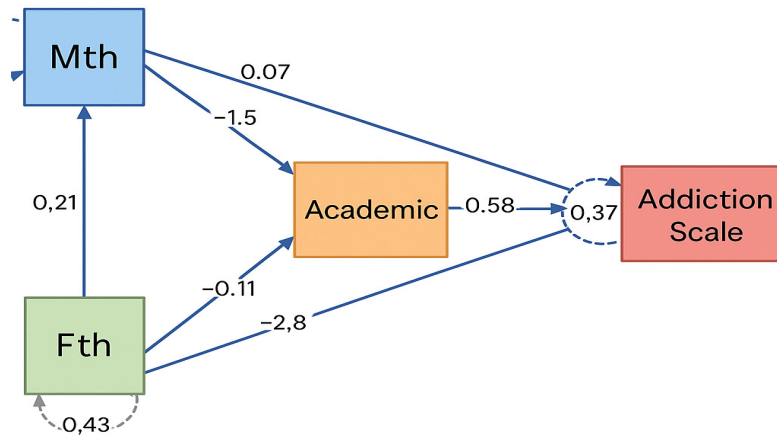
Figure 2. Structural Equation Model of Parental Influence on Academic Performance and Addiction Scale

The model illustrates how maternal and paternal roles affect academic performance and addiction levels, with direct and indirect paths showing varying strengths of influence.

4. **The Relative Contribution of Hours of Play, Game Type, and Mode of Play in Predicting Electronic Gaming Addiction Levels Among Students**

To achieve the objectives of the study and examine the predictive capacity of selected behavioral variables on electronic gaming addiction, a structural regression model was developed. The model included three independent variables: hours of play, game type, and mode of play (online/offline). Results indicated that hours of play had the strongest and most statistically significant effect on addiction levels, with an unstandardized coefficient of B = 11.529 and a standardized beta (β) of 0.428 (p < .001), suggesting that increased screen time is strongly associated with higher addiction scores. Game type also showed a statistically significant effect (B = 2.731, β = 0.132, p = 0.009), indicating that certain types of games—particularly combat games—are more likely to contribute to addictive behavior. In contrast, mode of play showed a negative but statistically non-significant effect (B = -3.957, p = 0.123), suggesting that whether the game is played online or offline does not meaningfully predict addiction levels when other variables are controlled.

Regarding model fit, the structural model was saturated (Degrees of Freedom = 0), rendering traditional goodness-of-fit indices such as the Chi-square test uninterpretable. However, the AIC and BIC values were 2676.210 and 2694.925, respectively, which can be used for model comparison. The explained variance (R^2) for the dependent variable showed that the model accounted for 21.9% of the variance in gaming addiction scores, indicating a moderate contribution from the included predictors—most notably hours of play and game type. This is clearly illustrated in Figure (X), which depicts the direction and strength of each path within the model, highlighting the dominant role of hours of play, the moderate effect of game type, and the weak, non-significant impact of mode of play on gaming addiction.
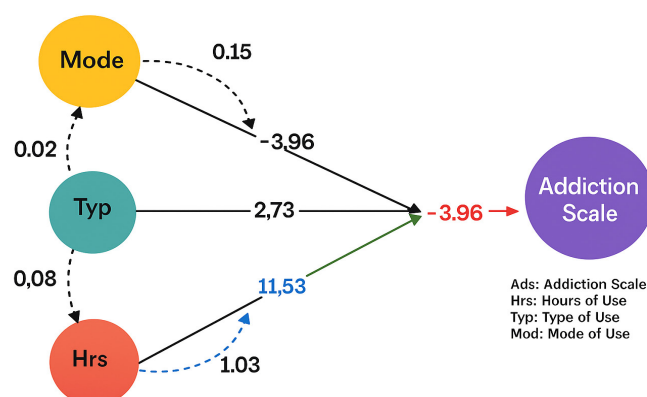

Figure 3 Path Diagram of Predictors Influencing Digital Addiction Scale

The diagram illustrates how Hours, Type, and Mode of digital use affect the Addiction Scale. Hours has the strongest positive effect (β = 11.53), showing that more screen time increases addiction. Type also shows a positive effect (β = 2.73), indicating some content types raise addiction risk. Mode shows a negative effect (β = -3.96), suggesting certain usage styles may reduce addiction. Weak correlations between predictors are also represented. The model explains a meaningful portion of digital addiction variance.

Discussion

The results indicated that the Number of playing hours is the strongest predictor of higher levels of digital game addiction among participants, explaining a substantial proportion of the variance in addiction levels.

This finding is consistent with (Alfaleh et al., 2024; Alhamoud et al., 2022; Kuss & Griffiths, 2012) in the general framework, suggesting that increased playing time is positively correlated with addiction indicators, and that prolonged gaming sessions contribute to reinforcing addictive behavioral patterns through mechanisms such as preoccupation, tolerance, and mood modification. However, this result contrasts with the findings of Griffiths (2012). (Ajam Zibad et al., 2025) In the general framework of disagreement, as these studies showed that gaming duration is not necessarily a direct indicator of addiction, and that mediating factors such as game type and personal motivations can explain addiction levels even with fewer gaming hours.

The researcher interprets the increase in gaming hours as a strong "dose–response" factor in explaining addiction, where prolonged exposure reinforces addictive behavioral patterns through enhancing neural reward circuits, increasing tolerance, and preoccupation—mechanisms described in DSM-5 and ICD-11 criteria for gaming disorder. This relationship is also supported by the Uses and Gratifications Theory, which suggests that individuals extend their playing time to fulfill psychological and social needs, and the Positive Reinforcement Theory, which posits that immediate in-game rewards reinforce the continuation of behavior.

The results revealed significant differences in addiction levels according to the type of game, with combat and war games being more strongly associated with higher levels of addiction compared to educational or recreational games.

This finding is consistent with (Koob & Le Moal, 2008; Mathiak et al., 2011; Palaus et al., 2017) in the general framework, which indicates that games with violent and competitive elements tend to increase addiction rates due to their ability to elicit emotional arousal and stimulate neural reward systems. However, this finding differs from (Carmona et al., 2025; Duan & Jeong, 2024; Pivetta, 2024), which suggested that game type may not be a decisive factor by itself, and that its influence depends on the interaction between the nature of the game and the player's individual characteristics and personal motivations.

The researcher explains this result by stating that violent or combat games activate the physiological arousal system and increase adrenaline and dopamine levels, enhancing the sense of challenge and euphoria, which leads to addictive behavioral patterns. This interpretation is supported by the Arousal Theory in physiological psychology and the Behavioral Reinforcement Theory, which emphasize that repeated rewards in a competitive environment increase behavioral attachment.

General analyses showed differences between those who play online and those who play offline. However, the effect of playing mode was not significant when controlling for variables such as playing hours and game type in structural models.

This result is consistent with (Cheng et al., 2018; Lopez-Fernandez et al., 2019), which indicated that playing mode may be associated with addiction levels, but this association diminishes or disappears when stronger factors such as time and content type are considered. However, it differs from (Saquib et al., 2023), which reported that online gaming is a direct and strong indicator of addiction, due to the presence of interactive and social elements that increase immersion.

The researcher interprets this result as indicating that online gaming provides a socially stimulating environment and strengthens emotional attachment to the game, but loses its predictive power when controlling for stronger variables such as hours and type. This interpretation is supported by the Online Social Interaction Theory, which suggests that social interactions in gaming environments can increase immersion but are not sufficient alone to explain addiction without temporal and content-related factors.

The results showed that males reported higher levels of addiction compared to females.

This finding is consistent with (Cheng et al., 2018; Kuss & Griffiths, 2012; Lopez-Fernandez et al., 2019) in the general framework, which indicates that males are more prone to digital game addiction due to competitive motivations and a greater inclination toward combat games. However, it differs from (Griffiths, 2012; King et al., 2019; Przybylski, 2014), which suggested that gender differences in addiction may not be consistent and may depend on the type of game as well as the social and cultural environment.

The researcher believes that gender differences stem from varying motivations and preferences; males tend to engage more in competition and combat challenges, whereas females are more inclined toward social or recreational games, reducing the likelihood of addiction to violent game types. This interpretation is supported by the Social Role Theory, which posits that socialization processes and cultural values shape patterns of recreational interest between genders.

The results showed differences in addiction levels according to the mother's educational level. At the same time, the father's education did not have a significant effect, and academic achievement was negatively associated with addiction.

This finding is consistent with (King et al., 2019; Kuss & Griffiths, 2012; Lopez-Fernandez et al., 2019) in the general framework, which points to the role of family and educational factors in regulating or reinforcing behaviors related to digital gaming.

However, it differs from what was reported, which reported a greater impact of the father's education compared to the mother's, or no direct relationship between academic achievement and addiction levels. The researcher suggests that the mother's education may influence parental supervision and time management for children, which in turn affects gaming behaviors. In contrast, the father's education may not have a direct effect if his guidance role is less involved on a daily basis. The negative relationship between academic achievement and addiction is explained by the Self-Regulation Theory, which indicates that individuals with higher self-regulation allocate their time efficiently between study and leisure, thereby reducing the risk of addiction.

Study Limitations

Although the current study provides valuable insights into the behavioral predictors of electronic gaming addiction among adolescents, several limitations must be acknowledged. First, the self-reported nature of the data may introduce subjective biases, particularly in estimating gaming hours and interpreting the type or mode of gameplay. Second, the model explains a moderate proportion of the variance in addiction levels, suggesting that additional psychological, environmental, or neurocognitive variables not included in the model may also play significant roles. Third, the study focused primarily on general behavioral predictors (e.g., hours, type, and mode of play) without accounting for individual psychological profiles such as impulsivity, emotional regulation, or peer influence, which might influence addiction vulnerability. Additionally, while the model showed strong predictive capacity for behavioral factors, it did not assess deeper emotional, familial, or clinical dimensions of gaming addiction. Finally, the sample was limited to students within specific age and educational ranges, which may limit the generalizability of the findings to other age groups or populations.

Practical Applications and Recommendations

The findings of this study highlight the importance of developing psychological and educational interventions targeting behavioral patterns associated with electronic gaming addiction among students, particularly given the strong influence of hours of play and game type on addiction levels. Practical applications include designing structured awareness and prevention programs that focus on the risks of excessive gaming and promote self-regulation and time-management skills. The study also recommends integrating cognitive-behavioral therapy techniques into school counseling and mental health services. Additionally, interactive digital tools and virtual reality applications can be utilized to deliver personalized interventions for high-risk students, taking into account the specific types of games they engage with. Future research is recommended to explore the emotional and psychological dimensions of gaming addiction and to evaluate the effectiveness of evidence-based programs across diverse educational settings and age groups to enhance generalizability and long-term impact.

Conclusions

This study provides valuable insights into the behavioral and psychological factors contributing to electronic gaming addiction among students. The findings demonstrate that excessive hours of play and specific game types—particularly combat-oriented games—are strong predictors of addiction. In contrast, the mode of play (online/offline) shows limited influence. Understanding these patterns is essential for identifying students at risk and guiding the development of targeted interventions that promote healthier gaming habits and reduce addiction-related impairments in daily functioning. By focusing on a vulnerable and digitally immersed population, this study aims to support the creation of school-based and psychological strategies that address the cognitive and emotional consequences of problematic gaming. Despite certain limitations, future research should expand to include emotional, familial, and neurocognitive variables and assess long-term intervention outcomes across different educational and cultural contexts.

Ethical Approval

This study was conducted in accordance with the Declaration of Helsinki and adheres to the general framework for research ethics at Imam Mohammad ibn Saud Islamic University. The target participants provided informed consent to participate in the study, which was carried out strictly for scientific and academic purposes while fully respecting their privacy and confidentiality.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflict Of Interest: The author declares no conflict of interest.

References

Abdel-Salam, D. M., Alrowaili, H. I., Albedaiwi, H. K., Alessa, A. I., & Alfayyadh, H. A. (2019). Prevalence of Internet addiction and its associated factors among female students at Jouf University, Saudi Arabia. *Journal of the Egyptian Public Health Association*, 94(1), 12.

Abolfotouh, M. A., & Barnawi, N. A. (2024). Prevalence and Prediction of Video Gaming Addiction Among Saudi Adolescents, Using the Game Addiction Scale for Adolescents (GASA). *Psychology Research and Behavior Management*, 3889–3903.

Ajam Zibad, M., Rahimian-Boogar, I., & Talepasand, S. (2025). Modeling Adolescents' Problem Behaviors Based on Personality Structure: The Mediating Role of Deviant Dependence on Peers. *Appl. Psychol*, 19(1), 103-123.

Akçakese, A., & Demirel, M. (2025). Recreational awareness prevents digital game addiction associated with social exclusion in adolescents. *World Leisure Journal*, 67(1), 54-73.

Alfaleh, A., Alzaher, A., Alkattan, A., Alabdulkareem, K., & Ibrahim, M. H. (2024). Prevalence of video gaming disorder in Saudi Arabia: a school-based national study. *Journal of the Egyptian Public Health Association*, 99(1), 20.

Alhamoud, M. A., Alkhalifah, A. A., Althunyan, A. K., Mustafa, T., Alqahtani, H. A., & Al Awad, F. A. (2022). Internet gaming disorder: Its prevalence and associated gaming behavior, anxiety, and depression among high school male students, Dammam, Saudi Arabia. *Journal of Family and Community Medicine*, 29(2), 93–101.

Andrade, E. A., & Galvão, M. C. B. (2025). International Statistical Classification of Diseases and Related Health Problems (ICD-11): from its origin to its use in digital systems. *Ciência & Saúde Coletiva*, 30, e01402024.

Ayaz-Alkaya, S., & Köse-Kabakcıoğlu, N. (2025). Prevalence and predisposing factors of digital game addiction and cyberbullying in adolescents: A cross-sectional study. *Public Health*, 241, 137-143.

Brailovskaia, J., Rohmann, E., Bierhoff, H.-W., Schillack, H., & Margraf, J. (2019). The relationship between daily stress, social support, and Facebook Addiction Disorder. *Psychiatry research*, 276, 167–174.

Carmona, A., Carbonell, X., Bonilla, I., Ivern, J., & Chamarro, A. (2025). Video Game Structural Features Are Related to Internet Gaming Disorder and Motivations of Play: Design and Validation of the Video Game Structure Scale (VGSS). *International Journal of Mental Health and Addiction*, 1-19.

Cheng, Y.-S., Tseng, P.-T., Lin, P.-Y., Chen, T.-Y., Stubbs, B., Carvalho, A. F., Wu, C.-K., Chen, Y.-W., & Wu, M.-K. (2018). Internet addiction and its relationship with suicidal behaviors: a meta-analysis of multinational observational studies. *The Journal of Clinical Psychiatry*, 79(4), 9291.

Duan, Z., & Jeong, G. (2024). What Drives Continuance Usage Intention Toward Virtual Reality Games? Gamer-Avatar Identification and Experiential Consumption Perspectives. *International Journal of Human–Computer Interaction*, 1-12.

Erdoğan, S. (2016). Digital Game Addiction Among Adolescents and Younger Adults: A Current Overview. *Turk Psikiyatri Dergisi Turkish Journal of Psychiatry*, 27(2), 0-0.

Fard, F. F., Pourmohamadreza-Tajrishi, M., & Vahedi, M. (2025). Incidence of Internet Gaming Disorder Among Adolescents in Iran. *International Journal of High Risk Behaviors & Addiction*, 14(1).

Giordano, A. L., Schmit, M. K., & McCall, J. (2023). Exploring adolescent social media and internet gaming addiction: The role of emotion regulation. *Journal of Addictions & Offender Counseling*, 44(1), 69–80.

Griffiths, M. D. (2012). The use of online methodologies in studying paraphilias—A review. *Journal of Behavioral Addictions*, 1(4), 143–150.

Huamani-Cahua, J. C., Ojeda-Flores, E., Medina Arce, N. R., Villanueva Kuong, L. E., & Ojeda-Flores, M. A. (2025). Explanatory model of behavioral adaptation in video game addiction among adolescents in urban and rural Peru: the mediating role of anxiety. *Frontiers in Psychology*, 16, 1500800.

Juthamanee, S., & Gunawan, J. (2021). Factors related to Internet and game addiction among adolescents: A scoping review. *Belitung Nursing Journal*, 7(2), 62.

Karaca, N. H., Aral, N., & Kaya, Ü. Ü. (2025). Digital Game Addiction and Peer Interaction: The Role of Parents' Education Levels. *Journal of Theoretical Educational Science*, 18(1), 131-156.

Kaya, A., & Pazarcıkcı, F. (2023). Structural equation modeling analysis of risk factors for digital game addiction in adolescents: A web-based study. *Archives of Psychiatric Nursing*, *43*, 22-28.

King, D. L., Delfabbro, P. H., Gainsbury, S. M., Dreier, M., Greer, N., & Billieux, J. (2019). Unfair play? Video games as exploitative monetized services: An examination of game patents from a consumer protection perspective. *Computers in Human Behavior*, *101*, 131–143.

Király, O., Griffiths, M. D., & Demetrovics, Z. (2015). Internet gaming disorder and the DSM-5: Conceptualization, debates, and controversies. *Current Addiction Reports*, *2*(3), 254-262.

Koob, G. F., & Le Moal, M. (2008). Neurobiological mechanisms for opponent motivational processes in addiction. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *363*(1507), 3113-3123.

Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions*, *1*(1), 3–22.

Lopez-Fernandez, O., Williams, A. J., & Kuss, D. J. (2019). Measuring female gaming: Gamer profile, predictors, prevalence, and characteristics from psychological and gender perspectives. *Frontiers in Psychology*, *10*, 898.

Mathiak, K. A., Klasen, M., Weber, R., Ackermann, H., Shergill, S. S., & Mathiak, K. (2011). Reward system and temporal pole contributions to affective evaluation during a first-person shooter video game. *BMC neuroscience*, *12*(1), 66.

Organization, W. H. (2020). World Health Statistics 2020.

Palaus, M., Marron, E. M., Viejo-Sobera, R., & Redolar-Ripoll, D. (2017). Neural basis of video gaming: A systematic review. *Frontiers in human neuroscience*, *11*, 248.

Pivetta, E. (2024). Adolescent Problematic Gaming And Its Association With Parental Factors: Sharpening The Focus From Distal To Proximal Mechanisms.

Przybylski, A. K. (2014). Electronic gaming and psychosocial adjustment. *Pediatrics*, *134*(3), e716-e722.

Raccio, I., Monterosso, S. C., Grassucci, D., Gelardini, M., Ardizzone, C., & La Torre, G. (2025). Internet gaming addiction as a risk factor for the development of Internet gaming disorder: cross-sectional observational study. *Journal of Public Health*, 1-12.

Rajab, A. M., Zaghloul, M. S., Enabi, S., Rajab, T. M., Al-Khani, A. M., Basalah, A., Alchalati, S. W., Enabi, J., Aljundi, S., & Billah, S. M. B. (2020). Gaming addiction and perceived stress among Saudi adolescents. *Addictive Behaviors Reports*, *11*, 100261.

Rosales-Navarro, C., & Torres Pérez, I. (2025). Parental Behaviors and Video Game Addiction in Adolescents: A Systematic Review. *International Journal of Mental Health and Addiction*, 1-22.

Saquib, N., Saquib, J., AlSalhi, A., Colder Carras, M., Labrique, A. B., Al-Khani, A. M., Chamsi Basha, A., & Almazrou, A. (2023). The associations between family characteristics and problematic Internet use among adolescents in Saudi Arabia. *International Journal of Adolescence and Youth*, *28*(1), 2256826.

Satapathy, P., Khatib, M. N., Balaraman, A. K., Kaur, M., Srivastava, M., Barwal, A., Prasad, G. S., Rajput, P., Syed, R., & Sharma, G. (2025). Burden of gaming disorder among adolescents: A systematic review and meta-analysis. *Public Health in Practice*, *9*, 100565.

Sywelem, M. M. G., & Alotaibi, S. B. (2025). Evaluating electronic gaming addiction impact on middle schoolers: Parental views. *Education and Information Technologies*, *30*(4), 4883–4906.

Wu, J. Y. W., Ko, H.-C., Wong, T.-Y., Wu, L.-A., & Oei, T. P. (2016). Positive outcome expectancy mediates the relationship between peer influence and Internet gaming addiction among adolescents in Taiwan. *Cyberpsychology, Behavior, and Social Networking*, *19*(1), 49-55.

Xie, Y., & Tang, L. (2024). The symptom network of internet gaming addiction, depression, and anxiety among children and adolescents. *Scientific Reports*, *14*(1), 29732.

Young, K. (2009). Understanding online gaming addiction and treatment issues for adolescents. *The American journal of family therapy*, *37*(5), 355–372.

Yue, Y. (2024). Effects of video game addiction on mental health. *Lecture Notes in Education Psychology and Public Media [Internet]*, *33*(1), 137–144.