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The Role of Mobile Game Usage on Mental Health, Academic Engagement, and Aggression in Adolescents

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A B S T R A C T

Objective: The present study aims to investigate the role of mobile game usage on mental health, academic engagement, and aggression among high school students in Tabriz.

Methods and Materials: This applied research is descriptive and correlational in nature. The statistical population comprised all female high school students in Tabriz during the 2021-2022 academic year. Based on the Morgan table and using cluster sampling, 251 students were selected and examined. Data were collected using the Goldberg Mental Health Questionnaire (1972), the Buss and Perry Aggression Questionnaire (1992), the Zarang Academic Engagement Questionnaire (2012), and a researcher-developed mobile game usage questionnaire. Data analysis was performed using Pearson's correlation coefficient and multiple (simultaneous) regression analysis.

Findings: The results showed a significant positive correlation between mobile game usage and mental health indicators (somatic symptoms, anxiety, social dysfunction, and depression) and aggression components (physical aggression, verbal aggression, anger, and hostility). Additionally, a significant negative correlation was found between mobile game usage and academic engagement, including cognitive, emotional, and behavioral engagement. Furthermore, regression analysis results indicated that mobile game usage variables could predict changes in students' mental health, aggression, and academic engagement.

Conclusion: Therefore, mobile games play an important role in students' mental health, aggression, and academic engagement.

Keywords: *Mobile games, aggression, academic engagement, mental health.*

1. Introduction

Many researchers identify the current generation as one of advanced communication technologies (Ullah, 2024; Whitted, 2024; Yasmin et al., 2024; Zhao, 2024). The formation of social networks is a prominent example of the community-creating phenomenon of the internet (Putri, 2024; Rizzo et al., 2024). Today, a population of over 533 million people worldwide spends a significant part of their daily lives on virtual networks (Li, 2024; Malika, 2024), with 363 million of them being adolescents (Kiritsinh, 2024). Therefore, many students communicate through virtual networks, and the extent of this communication is no less than face-to-face interactions (Anopchand, 2024; Awan, 2024; Putri, 2024). Social media is a networked infrastructure through which individuals and communities share, produce, discuss, and moderate user-generated content (Kim et al., 2024; Kingsley, 2024; Malika, 2024; Mosharrafa, 2024).

In our country, the age chart of users of colorful virtual networks such as Facebook, WeChat, Viber, WhatsApp, and Telegram seems to be decreasing, with an unrestricted presence of students among internet users. Statistics show that 33% of students spend their leisure time on virtual networks via the internet and mobile applications (Naeimi, 2017). A national survey in the United States indicates that 93% of adolescents are online, with 65% of them reporting using virtual networks (Szwedo et al., 2011). Additionally, the Center for Islamic Revolution Documents announced in June 2015 that over 1.3 million students participated in the final exams of 2014, with 80% passing with an average grade of 12. Some educational experts attribute this academic decline to students being preoccupied with virtual spaces and social networks (Awan, 2024; Awopetu, 2024).

Children are influenced by their home, school, peer group, and mass media. Currently, the influence of mass media on everyone, including children, is significant. Among these media are mobile and computer games. Today, electronic games are considered a form of entertainment for children, adolescents, young adults, and even adults. These games, with their dynamic images and exciting sounds, bring a world of excitement and imagination where the individual perceives themselves as the central hero of the story. Since the child is the player and engaged in the game along with other characters designed by the game's creators, it is highly attractive to them. Mobile games are an interactive form of entertainment played on an electronic device equipped with a processor or microcontroller. Mobile games, as a social phenomenon alongside other audio-visual media in today's world due to the rapid growth of communication technologies, have recently attracted a substantial audience among children and adolescents, occupying not only their leisure time but also the time meant for homework or family interactions.

Despite the widespread expansion of media, mobile-based computer games seem to have a major role in filling adolescents' leisure time. Computer games are one of the most affordable ways to spend leisure time and can be used at any time of the day or night at home. This may be why computer games remain one of the most popular mass media, playing a significant role in the lives of adolescents and young adults in filling their free time (Jafari & Andalibian, 2018). Mobile-based computer games are rapidly attracting many children and adolescents. These games can have positive effects such as personality development, talent cultivation, creativity enhancement, concentration, and attention development, increased intelligence, expanded worldview, artistic appreciation, education of complex concepts, cultural transmission, and more. However, due to the lack of proper education for children and adolescents, incorrect introduction of computer games and their types, and users' unfamiliarity with computer language, the goals of mobile-based computer games are not well understood, leading children and adolescents toward games with harmful effects (Jafari & Andalibian, 2018; Liu et al., 2017).

One variable that mobile-based games can affect is children's mental health. For instance, in a study, Wang (2022) showed that parental conflicts affect online game addiction symptoms, and such conflicts and adolescent loneliness can increase mobile game usage and reduce mental health (Wang, 2022). Overactivity in virtual networks can also be influenced by its adverse effects, increasing levels of anger and aggression. Aggression is defined as an unpleasant inner emotional state with varying frequency and intensity, often accompanied by incorrect thoughts and perceptions, physical arousal, and an increasing tendency to engage in culturally inappropriate verbal or physical behaviors (Rahimi Ahmad abadi et al., 2014). Yen et al. (2011) found that individuals dependent on virtual networks exhibited high aggression in both the real and virtual (internet) worlds (Yen et al., 2011). Ko et al. (2009) also showed that students dependent on virtual networks reported many aggressive behaviors over the past year (Ko et al., 2009). Liu et al. (2019) concluded that

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dependency on social networks and computer games leads to severe negative effects, including mental health issues, sleep quality, interpersonal relationships, and academic performance (Liu et al., 2017). Przybylski and Weinstein (2019) found that excessive computer game usage can increase violence and aggression among students (Przybylski & Weinstein, 2019).

Virtual networks, as new communication technologies, play an important role in students' learning, with academic engagement being one of the most important indicators of education quality (van Uden et al., 2014). Academic engagement is a form of psychological investment and direct effort to learn, understand, and master the necessary knowledge and skills. Academic engagement, as a variable, has entered the realm of education studies, with several studies conducted in educational organizations (Suharsono, 2024). Bickerdike et al. (2016) found that excessive virtual network usage leads to poor study habits associated with reduced academic engagement (Bickerdike et al., 2016). Cabrillos et al. (2022) concluded that using virtual networks and mobile-based games affects students' academic performance, reducing performance and academic engagement (Cabrillos et al., 2023).

Academic problems in early years can lay the foundation for academic issues in higher education levels; therefore, attention to students' psychological problems is essential. Considering the prevalence of virtual network usage and increasing dependency among students and mobile-based game usage, which has been less studied among elementary students in Iran, the results of this study hold significant clinical and research importance. The findings can also play an important role in helping educational counseling centers, as this can significantly influence the educational and therapeutic programs of student counseling centers. Counseling centers can take necessary actions to address virtual network dependency among students. Given the contradictory research findings on the role of mobile-based games on academic engagement, aggression, and mental health, the central question of this research is whether mobile-based game usage affects students' mental health, academic learning, and aggression.

2. Methods and Materials

2.1. Study Design and Participants

This applied research is descriptive and correlational in nature. The statistical population consisted of all female high school students in Tabriz during the 2021-2022 academic year, from which, based on the Morgan table and cluster sampling method, 251 students were selected and examined. The implementation method involved randomly selecting five girls' high schools in Tabriz, from which eight classes were selected and examined.

2.2. Measures

2.2.1. Mental Health

This test, developed by Goldberg (1972), consists of 28 questions and assesses the individual's general health across four subscales: somatic symptoms, anxiety, social dysfunction, and depression, scored on a scale from 0 to 3. If an individual scores 6 or higher on any subscale or 22 or higher in total, it indicates pathological symptoms. In a study by Taghavi (2001), the reliability coefficient of this questionnaire was reported as 0.72 through test-retest reliability. Another study by Hooman (1997) reported the reliability coefficient of this questionnaire between 0.84 and 0.92 (Tabatabaei & Rasouli, 2018).

2.2.2. Aggression

The new version of the aggression questionnaire, revised by Buss and Perry (1992), is a self-report tool consisting of 29 items across four subscales: physical aggression, verbal aggression, anger, and hostility. Respondents rate each item on a 5-point Likert scale ranging from "extremely characteristic of me" (5) to "extremely uncharacteristic of me" (1). Items 9 and 16 are reverse-scored. The total aggression score is the sum of the subscale scores. The minimum and maximum scores on this questionnaire are 29 and 145, respectively. The reliability and validity of this questionnaire are satisfactory. The test-retest reliability for the four subscales (over 9 weeks) ranged from 0.72 to 0.80, with inter-correlations between subscales ranging from 0.38 to 0.49. Cronbach's alpha coefficients indicated internal consistency: physical aggression (0.82), verbal aggression (0.81), anger (0.83), and hostility (0.80) (Ahmadian et al., 2024).

2.2.3. Academic Engagement

Developed by Zarang (2012), this questionnaire contains 38 items with five Likert-scale options. Scoring ranges from 1 ("always incorrect") to 5 ("always correct"). It measures three components: cognitive, emotional, and behavioral engagement. The reliability of this tool was reported as 0.90 in Zarang's study, with content validity confirmed by expert

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judgment. In a study by Siyami et al. (2014), the reliability coefficient was reported as 0.97 using Cronbach's alpha (Masoomi Jahandizi et al., 2023).

2.2.4. Mobile Game Usage

This researcher-developed questionnaire assesses the extent of mobile game usage and includes 25 items across four components: individual performance, time management, self-control, and social relationships, scored on a 5-point Likert scale. The minimum and maximum scores are 25 and 125, respectively. Content validity was reviewed by psychology experts and revised based on a pilot study with 40 students. The reliability coefficient, assessed using Cronbach's alpha, was 0.87, indicating satisfactory reliability (Faghiharam, 2019; Sadoughi, 2017).

2.3. Data analysis

The data analysis in this study was conducted using descriptive statistical methods, specifically mean and standard deviation, to summarize the research variables. Simple regression analysis was employed to examine the relationships between mobile game usage and the dependent variables: mental health, academic engagement, and aggression among high school students. Pearson's correlation coefficient was used to assess the strength and direction of these relationships. Additionally, ANOVA tests were performed to evaluate the significance of the regression models. The data were processed using SPSS software, and the results were presented in tables following APA format, highlighting the statistical significance and the explanatory power of the independent variables in predicting changes in the dependent variables.

3. Findings and Results

For data analysis, descriptive statistics methods such as mean and standard deviation were used. The results of the descriptive statistics (mean, standard deviation, etc.) of the research variables are presented below:

Table 1

Descriptive Statistics for Research Variables

Variable	Component	Mean	Standard Deviation	Standard Error of Mean
Mobile Game	Individual Performance	21.44	0.21	3.46
	Time Management	9.23	0.15	2.52
	Self-Control	11.32	0.18	2.95
	Social Relationships	7.49	0.11	1.76
	Mobile Games Total	49.51	0.40	6.41
Academic Engagement	Cognitive Engagement	33.44	0.89	14.11
	Motivational Engagement	18.42	0.27	4.40
	Behavioral Engagement	30.88	0.55	8.82
	Total Academic Engagement	82.76	1.27	20.23
Aggression	Physical Aggression	30.35	0.29	4.59
	Verbal Aggression	12.29	0.37	5.99
	Anger	19.88	0.35	5.59
	Hostility	26.78	0.35	5.61
	Total Aggression	89.31	0.97	15.44
Mental Health	Somatic Symptoms	11.07	0.27	4.33
	Anxiety	12.06	0.26	4.24
	Social Dysfunction	11.43	0.27	4.41
	Depression	9.89	0.25	4.10
	Total Mental Health	44.46	0.81	12.83

The data in Table 1 indicate that the means for individual performance, time management, self-control, social relationships, and total mobile games are 21.44, 9.23, 11.32, 7.49, and 49.51, respectively. Moreover, the resutls indicate that the means for cognitive, motivational, and behavioral engagement and total academic engagement are 33.44, 18.42, 30.88, and 82.76, respectively. Additionally, the means for physical aggression, verbal aggression, anger, hostility, and total aggression are 30.35, 12.29, 19.88, 26.78, and 89.31, respectively. Finally, the means for somatic symptoms, anxiety, social dysfunction, depression, and total mental health are 11.07, 12.06, 11.43, 9.89, and 44.46, respectively.

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The results show that there is a relationship between mobile game usage and students' mental health. Simple regression analysis was used for this study, and the results are shown in the following tables:

Table 2

ANOVA for Criterion Variable Changes Based on Mobile Game Variables

Model	Sum of Squares	df	Mean Square	F	p
Regression	4726.88	4	1181.72	7.97	0.001
Residual	36451.50	246	148.17		
Total	41178.39	250			

Table 2 shows that the F-statistic for the ANOVA test of criterion variable changes based on mobile game variables is 7.97, which is statistically significant ($p < 0.05$). Therefore, it can be concluded that there is a significant linear relationship between mobile game usage and mental health.

Table 3

Regression Coefficients for Mental Health Based on Mobile Game Usage

Source	B	Standard Error	Standardized Beta	t	p
Intercept	15.97	6.24	-	2.55	0.01
Individual Performance	0.46	0.22	0.12	2.03	0.04
Time Management	0.77	0.31	0.15	2.48	0.01
Self-Control	0.98	0.27	0.22	3.62	0.001
Social Relationships	0.04	0.44	0.006	0.09	0.92

As shown in Table 3, the self-control variable with a positive standardized beta coefficient ($\beta = 0.22$, $p = 0.001$) has a 22% role, time management with a positive standardized beta coefficient ($\beta = 0.15$, $p = 0.01$) has a 15% role, and individual performance with a positive standardized beta coefficient ($\beta = 0.12$, $p = 0.04$) has a 12% role in explaining students' mental health. There is a significant positive relationship between mobile game usage and mental health (a higher score on the mental health questionnaire indicates pathological symptoms). In fact, with an increase in mobile game usage, the level of mental health and its components (somatic symptoms, anxiety, social dysfunction, and depression) also increase.

Another result of this study is that there is a relationship between mobile game usage and students' academic engagement. Simple regression analysis was used, and the results are shown in the following tables:

Table 4

ANOVA for Academic Engagement Variable Changes Based on Mobile Game Variables

Model	Sum of Squares	df	Mean Square	F	p
Regression	10621.52	4	2655.38	7.11	0.001
Residual	91786.13	246	373.11		
Total	102407.65	250			

Table 4 shows that the F-statistic for the ANOVA test of criterion variable changes based on mobile game variables is 7.11, which is statistically significant ($p < 0.05$). Therefore, it can be concluded that there is a significant linear relationship between mobile game usage and academic engagement.

Table 5

Regression Coefficients for Academic Engagement Based on Mobile Game Usage

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Source	B	Standard Error	Standardized Beta	t	p
Intercept	130.21	9.91	-	13.13	0.001
Individual Performance	-0.77	0.35	-0.13	-2.16	0.03
Time Management	-0.33	0.49	-0.04	-0.68	0.49
Self-Control	-1.32	0.43	-0.19	-3.07	0.002
Social Relationships	-1.69	0.70	-0.14	-2.39	0.01

As shown in Table 5, the self-control variable with a negative standardized beta coefficient (β = -0.19, p = 0.002) has a 19% role, social relationships with a negative standardized beta coefficient (β = -0.14, p = 0.01) has a 14% role, and individual performance with a negative standardized beta coefficient (β = -0.13, p = 0.03) has a 13% role in explaining students' academic engagement. There is a significant negative relationship between mobile game usage and academic engagement. In fact, with an increase in mobile game usage, the level of academic engagement and its components (cognitive, emotional, and behavioral engagement) decreases.

Table 6

ANOVA for Criterion Variable Changes Based on Mobile Game Variables

Model	Sum of Squares	df	Mean Square	F	p
Regression	6675.13	4	1668.78	7.74	0.001
Residual	52984.62	246	215.38		
Total	59659.76	250			

Table 6 shows that the F-statistic is 7.74, which is statistically significant ($p < 0.05$). Therefore, it can be concluded that there is a significant linear relationship between mobile game usage and aggression.

Table 7

Regression Coefficients for Aggression Based on Mobile Game Usage

Source	B	Standard Error	Standardized Beta	t	p
Intercept	51.32	7.53	-	6.81	0.001
Individual Performance	0.48	0.27	0.10	1.76	0.07
Time Management	0.98	0.37	0.16	2.64	0.009
Self-Control	0.75	0.32	0.14	2.32	0.02
Social Relationships	1.31	0.53	0.15	2.46	0.01

As shown in Table 7, the time management variable with a positive standardized beta coefficient (β = 0.16, p = 0.009) has a 16% role, social relationships with a positive standardized beta coefficient (β = 0.15, p = 0.01) has a 15% role, and self-control with a positive standardized beta coefficient (β = 0.14, p = 0.02) has a 14% role in explaining students' aggression. There is a significant positive relationship between mobile game usage and aggression. In fact, with an increase in mobile game usage, the level of aggression and its components (physical aggression, verbal aggression, anger, and hostility) also increases.

4. Discussion and Conclusion

The present study aimed to investigate the role of mobile game usage on the mental health, academic engagement, and aggression of high school students in Tabriz. The first finding showed that the self-control variable with a positive standardized beta coefficient (β = 0.22, p = 0.001) has a 22% role, time management with a positive standardized beta coefficient (β = 0.15, p = 0.01) has a 15% role, and individual performance with a positive standardized beta coefficient (β = 0.12, p = 0.04) has a 12% role in explaining students' mental health. There is a significant positive relationship between mobile game usage and mental health (a higher score on the mental health questionnaire indicates pathological symptoms). In fact, with an increase in mobile game usage, the level of mental health and its components (somatic symptoms, anxiety, social dysfunction, and depression) also increase. This finding is consistent with the results of prior studies (Jafari & Andalibian, 2018; Ko et al., 2009; Mosharrafa, 2024; Przybylski & Weinstein, 2019; Roblyer et al., 2010; Yen et al., 2011; Zhao, 2024), who found that there is a significant relationship between the extent of computer game usage and students' mental health,

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and increased use of mobile games reduces psychological health among students.

In explaining this finding, it can be said that many computer games are designed and defined to compel the player and audience to continue and follow the game's path. Prolonged and excessive play in an atmosphere that constantly keeps the individual in states of neurological-visual and auditory stimulation, elevates decision-making tensions to their highest levels, and is sometimes accompanied by adrenaline secretion. When the nervous system detects abnormalities, it places the body on high alert, and since most of these games involve minimal physical activity, they disrupt the normal and defined functions of the nervous systems, keeping the individual's nervous system in a state of constant readiness throughout the gaming period. When a child frequently spends long periods in such a state, it adversely affects their mental health, increasing anxiety and depression. Computer and mobile-based games lead to depression in children, as the greatest goal and wish of children who consider gaming as a primary need in their lives is to reach the final stage and win. Such children experience severe disappointment and self-blame if they lose. On the other hand, winning without thinking of other goals beyond the game results in fleeting feelings of happiness that quickly turn into a sudden sense of emptiness and lack of motivation after the game ends. Additionally, long and solitary gaming reduces verbal communication with family, leading the child to become introverted and avoid interaction in other social settings. The lack of emotional needs and isolation paves the way for depression and psychological problems (Ahmadian et al., 2024; Ko et al., 2009; Yen et al., 2011).

Another finding showed that the self-control variable with a negative standardized beta coefficient ($\beta = -0.19$, $p = 0.002$) has a 19% role, social relationships with a negative standardized beta coefficient ($\beta = -0.14$, $p = 0.01$) has a 14% role, and individual performance with a negative standardized beta coefficient ($\beta = -0.13$, $p = 0.03$) has a 13% role in explaining students' academic engagement. There is a significant negative relationship between mobile game usage and academic engagement. In fact, with an increase in mobile game usage, the level of academic engagement and its components (cognitive, emotional, and behavioral engagement) decreases. This finding is consistent with the results of prior studies(Cabrillos et al., 2023; Naeimi, 2017). Students engaged in social networks have decreased focus on studies and suffer from academic decline. These students have lower levels of academic engagement.

In explaining this finding, it can be said that the use of mobile games negatively affects learning and the current and future success of learners. Excessive use of these games causes delays in starting and completing assignments, leading to missed opportunities for timely learning. Consequently, the individual follows studying and completing assignments at inappropriate times, always with time constraints, disrupting the learning process, reducing accuracy, increasing stress, and making numerous mistakes in assignments and the learning process. This leads to lower academic engagement as individuals spend more time using mobile games and less time on studying and assignments (Cabrillos et al., 2023).

Addiction to computer games over time leads to mental laziness, as these games are created by others and the user simply consumes them, meaning the individual has no power of intervention or control over them. This leads to a loss of self-confidence against others' achievements, feeling mentally inadequate. Excessive mobile gaming leads individuals to continuously play without realizing the passage of time. Many people think they are introverts, but it is actually the gaming that causes their withdrawal. This results in discouragement from studying, leading to low academic engagement (Cabrillos et al., 2023; Naeimi, 2017).

Given that students who spend more time playing computer games have weaker performance and since one of the main reasons for children's and adolescents' tendency towards these games is easy access and the lack of proper programs by parents and families to fill children's and adolescents' leisure time and lack of access to suitable sports and recreational facilities, parents are advised to control the time spent on computer games, plan appropriate activities for their children's leisure time, and encourage reading to replace gaming. It is also recommended that software developers consult with educational, training, and psychological experts to design programs that enhance students' academic performance and engagement. Child and family psychologists can use these findings for educational and family counseling or employ computer games in teaching to help convey educational concepts.

Another finding showed that the time management variable with a positive standardized beta coefficient ($\beta = 0.16$, $p = 0.009$) has a 16% role, social relationships with a positive standardized beta coefficient ($\beta = 0.15$, $p = 0.01$) has a 15% role, and self-control with a positive standardized beta coefficient ($\beta = 0.14$, $p = 0.02$) has a 14% role in explaining students' aggression. There is a significant positive relationship between mobile game usage and aggression. In

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fact, with an increase in mobile game usage, the level of aggression and its components (physical aggression, verbal aggression, anger, and hostility) also increases. This finding is consistent with the results of previous studies (Anderson & Dill, 2000; Gülbahar et al., 2010; Przybylski & Weinstein, 2019), who found that excessive use of computer games is positively and significantly related to aggression, and increased use of computer games leads to increased aggression among students. In explaining this finding, it can be said that excessive internet use and dependency on mobile gaming leads students to spend a lot of time on the internet and web browsing, exposing them to many behaviors, including internet fraud and risky online behaviors, which subsequently increase aggression. When deceived by individuals not directly accessible, addicted students internalize their anger towards those individuals, leading to displaced aggression, where they exhibit aggressive behaviors towards others, including peers and classmates, displaying behaviors such as aggression, insult, obstinacy, and hostility. Students who use the internet and mobile games less have better relationships with their mothers and friends, fewer academic problems, and lack aggression as they are not dependent on virtual networks (Anderson & Dill, 2000; Przybylski & Weinstein, 2019).

Violence is a key attraction in mobile games, especially in genres such as action, real-time strategy, and war games, which have significant impacts on children's behavior and reactions. According to ecological theory, displaying aggressive behaviors in mobile games leads to the recognition of aggression, becoming a significant factor for violence in children. Game developers justify aggressive behaviors in game scenarios with reasons such as self-defense or defeating enemies, portraying aggression as natural defense, which influences children to lose their internal aggression inhibitors over time. Repetition of violent scenes such as killing with firearms, decapitation, slaughter, etc., desensitizes children to pain and suffering, embedding hostility and violence in their minds. According to the active conditioning theory, since players are rewarded for aggressive behaviors, conditioning them to see aggression as beneficial and valuable, rewards or positive reinforcement through points solidify aggression in their internal behaviors, making aggression a suitable method for resolving interpersonal conflicts and frustration (Przybylski & Weinstein, 2019).

5. Limitations & Suggestions

One limitation of this study is the lack of cooperation from schools in sampling and conducting training in some cases. Also, considering this research was conducted among female high school students in Tabriz, generalizing these findings to other students and schools should be done cautiously. Based on the study's findings, it is recommended to hold classes on the proper use of mobile games for students to increase awareness and skills for appropriate use, improving mental health and aggression. Given that children's and adolescents' tendency towards these games is due to easy access and lack of proper programs from parents to fill leisure time, parents are advised to control game usage time, plan optimal leisure activities, and promote reading. Developers of cultural software are also encouraged to seek guidance from educational and psychological experts to design programs that improve students' academic performance and engagement. Child and family psychologists can utilize these findings for academic and family counseling or incorporate computer games into teaching to facilitate educational concept transmission.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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