HMIS
Health Management and Information Science

Original Article

The Relationship between Aggression and Video Game Addiction in Students: The Mediating Role of Emotion Regulation Difficulty and Social Empathy

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Abstract

Introduction: Understanding the link between video games, aggression, and underlying emotional factors is crucial in informing educational practices and parental guidance for healthy youth development. The present study aimed to investigate the relationship between aggression and video game addiction in students with the mediating role of emotion regulation difficulty and social empathy.

Methods: The study employed a descriptive correlational research design. The target population encompassed all students enrolled in high schools within Aran and Bidgol City, Iran, during the year 2023. A multistage sampling approach was employed to generate a sample of 300 participants. Data collection instruments included the Aggression Questionnaire, Game Addiction Scale, Difficulties in Emotion Regulation Scale, and Empathy Assessment Scale. Structural equation modeling (SEM), implemented using AMOS software, served as the primary statistical technique for testing the hypothesized relationships between the variables.

Results: The findings revealed significant correlations among the study variables. Aggression was correlated with video game addiction (r=0.65, P<0.001), emotion regulation difficulty (r=0.56, P<0.001), and social empathy (r=-0.67, P<0.001). The results demonstrated that emotion regulation difficulty and social empathy significantly mediated the association between aggression and video game addiction (P<0.001).

Conclusion: This study revealed significant correlations between aggression, video game tendency, emotion regulation difficulty, and social empathy in adolescents. Furthermore, emotion regulation difficulty and social empathy emerged as significant mediating factors in the relationship between aggression and video game tendency. These findings suggest that aggression not only directly influences video game use, but also exerts its influence indirectly through emotional regulation and social cognition.

Keywords: Aggression, Emotional regulation, Empathy, Students, Video game

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Introduction

Adolescence represents a unique and transformative period in an individual's life, characterized by distinct developmental milestones and challenges that warrant the attention of developmental psychologists (1). During this pivotal stage, adolescents exhibit a surge in physical, cognitive, and emotional growth, necessitating tailored approaches and support systems (2). Adolescence serves as a critical phase for personality formation and identity exploration, while contemporary societal demands present adolescents with a unique set of challenges and complexities (3). In this context, education systems bear a crucial responsibility in preparing individuals, particularly adolescents, for their future roles and contributions to society (4). Among the pressing concerns in adolescent development, the pervasive and potentially problematic prevalence of video game engagement warrants particular attention (5). Indeed, video game addiction has emerged as a significant issue affecting adolescents worldwide (6).

Video game engagement is a voluntary activity that can disrupt individuals' daily routines and life paths (7). The rise of video games as a common pastime has sparked significant concerns among researchers, educators, and parents (8). While supporters view video games as gateways

to creativity for children and adolescents, highlighting benefits such as improved computer literacy, language skills, hand-eye coordination, and structured downtime (9), critics worry about their increasingly realistic and immersive nature, often enhanced by advancements in technology that can create simulated violent environments (10, 11). The interactive elements of video games, which involve players in narratives, intensify these concerns (12). As children and adolescents immerse themselves in these gaming worlds, it is essential to consider their impact on social interactions and development since play is vital in shaping these experiences (13). Some video games exhibit addictive traits that can lead to problematic behaviors; games in which players embody protagonists may increase the risk of mimicking aggressive actions (14). Shao and Wang (15) indicate that the popularity of violent video games among children may contribute to the development of aggressive tendencies in adolescence.

Aggression is a significant concern during adolescence, manifesting as verbal abuse, threats, shouting, interpersonal competition, and social isolation. Defined by the intention to harm oneself or others, aggressive behavior occurs when actions deliberately aim at causing injury (16). Aggressive adolescents are more prone to perceiving hostility in social interactions and often lack sensitivity to social cues, leading to misinterpretations of ambiguous situations. Consequently, they exhibit more inappropriate and aggressive responses compared to their non-aggressive peers (17). Research consistently shows that exposure to violent video games is linked to increased aggression (18, 19). While about 80% of adolescents play video games, 40% demonstrate excessive or problematic use (20). Due to their curiosity-seeking tendencies and the normalization of violence in video games, adolescents are particularly at risk for the adverse effects of gaming, including heightened aggression (21).

Research has established a connection between difficulties in emotion regulation and aggression (22). Emotion regulation, a complex process involving individual traits, situational factors, and strategic interventions, encompasses the initiation, maintenance, modulation, and transformation of emotional states and associated physiological processes to achieve personal goals (23). It refers to the ability to monitor, evaluate, and modify emotional responses to support adaptive functioning. This includes both conscious and unconscious processes to alter subjective experiences or the emotion-eliciting context (24). Difficulties in emotion regulation often lead to maladaptive coping strategies, such as ineffective responses, challenges in behavior control during emotional disturbances, and mismanagement of emotional information. These difficulties have been linked to various mental health disorders, including borderline personality disorder, depression, and substance abuse (25). Such difficulties can manifest as impairments in identifying and describing emotions, regulating emotional responses, and implementing appropriate emotion regulation strategies, resulting in heightened maladaptive emotional responses (26).

Social empathy significantly influences aggression (27). Defined as the ability to understand the emotions and perspectives of others, empathy informs one's behavior toward them. Research indicates that individuals with high empathy are more likely to show forgiveness and concern for others' well-being, leading to more fulfilling relationships and enhanced personal well-being (28). According to Marshall and Marshall (29), a deficiency in social empathy can predict increased aggression. Social empathy includes both a cognitive component, which involves understanding others' emotions, and an affective component, which entails sharing those emotions. Signs of social empathy emerge early in childhood and are essential for effective social interactions. Empathy skills bridge connections between individuals and are crucial for cultivating strong relationships. By adopting others' perspectives, individuals gain a better grasp of social dynamics, facilitating smoother interactions (30).

This study investigates the relationship between video game habits and aggressive behavior in students, examining the potential influence of two key factors: emotion regulation difficulties and social empathy. By exploring these connections, the research aims to illuminate the mechanisms through which video games might impact aggression. Understanding this interplay can inform educational practices and parental guidance, potentially mitigating the negative effects of video games while promoting

emotional regulation skills and social empathy in students. The proposed research model posits that video game habits are associated with aggressive behavior and that this relationship is mediated by emotion regulation difficulties and social empathy. Specifically, the following hypotheses were posed: 1) There is a positive relationship between video game habits and aggressive behavior; 2) There is a positive relationship between video game habits and emotion regulation difficulties; 3) There is a negative relationship between video game habits and social empathy; 4) Emotion regulation difficulties mediate the relationship between video game habits and aggressive behavior; and 5) Social empathy mediates the relationship between video game habits and aggressive behavior.

Methods
Design and Participants
The present study employed a descriptive correlational design. The target population comprised all male high school students in Aran and Bidgol City in 2023. A sample of 300 participants was selected using a multistage sampling method. In the first stage, five boys schools were randomly selected from a list of eligible schools in the region. In the second stage, 60 students from each selected school were randomly chosen using simple random sampling, resulting in a total sample size of 300 participants. The target sample size was initially estimated at 280 participants based on the number of study variables. To account for a projected 10% attrition rate, the recruitment target was increased to 308. Following the exclusion of 8 incomplete questionnaires, the final sample comprised 300 participants. Inclusion criteria were enrollment in secondary schools in Aran and Bidgol in 2023, informed consent from both students and parents, an age range between 16 and 18 years, and video game-playing habits. Exclusion criterion was incomplete questionnaires.

Instruments
The Aggression Questionnaire (AQ)
Aggression was assessed using the validated Persian version of the Aggression Questionnaire (AQ) (31). This 29-item, self-report measure employs a five-point Likert scale (1=extremely uncharacteristic, 5=extremely characteristic) with four key dimensions of aggression: physical aggression (9 items), verbal aggression (5 items), anger (7 items), and hostility (8 items). Each subscale score is derived from the sum of its corresponding items (e.g., physical aggression: items 1-9). The total AQ score ranges from 29 to 145. A score higher than 78 indicates greater aggression. The instrument demonstrates good internal consistency in this study (Cronbach's alpha=0.81), replicating findings from previous research using the Persian version (32).

Game Addiction Scale (GAS)
The 7-item Game Addiction Scale (GAS) was utilized to assess problematic online gaming behaviors (33). Participants employed a five-point Likert scale (1=never, 5=very often) to rate the frequency of their gaming behaviors. Higher GAS scores indicate a greater propensity for problematic online gaming. The Persian version of the GAS has demonstrated good internal consistency, with Lin et al. (34) reporting a Cronbach's alpha of 0.85. In this study, the GAS demonstrated acceptable internal consistency with a Cronbach's alpha of 0.79, suggesting a reliable measurement of problematic online gaming behaviors.

Difficulties in Emotion Regulation Scale (DERS)
The Difficulties in Emotion Regulation Scale (DERS) served as a self-report measure to assess the participants' emotional regulation patterns (35). This 36-item instrument utilizes a five-point Likert scale (1=nearly never, 5=nearly always) and evaluates emotion regulation difficulties across six subscales: non-acceptance of negative emotions (non-acceptance) (6 items), difficulties engaging in goal-oriented behaviors (goals) (5 items), difficulties controlling impulsive behaviors (impulse) (6 items), limited access to effective regulation strategies (strategies) (8 items), lack of emotional awareness (awareness) (6 items), and lack of emotional clarity (clarity) (5 items). The total DERS score ranges from 36 to 180, with a cutoff score of 78 commonly used to indicate clinically significant difficulties in emotion regulation. Higher scores on the DERS suggest greater challenges in managing emotions, such as difficulties in controlling emotional responses, accepting negative emotions, and regulating emotional intensity. The DERS demonstrates good internal consistency in this study (Cronbach's alpha=0.88), exceeding the

Table 1: Descriptive statistics and Pearson correlation coefficients for the study variables

Variables	Mean±SD	1	2	3	4
1- Computer game addiction	28.32±5.33	1			
2- Social empathy	37.88±6.30	-0.67**	1		
3- Emotion regulation difficulty	124.68±14.76	0.56**	-0.47**	1	
4- Aggression	85.26±18.17	0.65**	-0.51**	0.34**	1

**P <0.01

reliability reported by Yazdizadeh et al. (36) for the Persian version (α=0.81).

Empathy Assessment Scale (EAS)

Empathy was assessed using the 15-item Empathy Assessment Scale (EAS) developed by Wang et al. (37). This self-report measure employs a three-factor structure encompassing cognitive empathy, emotional reactivity, and social skills (five items per subscale). Participants rated their agreement with each statement using a five-point Likert scale ranging from "strongly disagree" to "strongly agree." The total EAS score ranges from 15 to 75, with a cutoff score of 40 often used to indicate clinically significant deficits in empathy. Higher scores on the EAS suggest greater levels of empathy, including the ability to understand and share the emotions of others. The instrument demonstrates good internal consistency, with Sharifi-Tehrani et al. (38) reporting a Cronbach's alpha of 0.83. In this study, the EAS yielded a Cronbach's alpha of 0.80, indicating a reliable measurement of empathy.

Data Analysis

To assess the normality of the data, we calculated skewness and kurtosis statistics for each variable. Pearson's correlation coefficients were employed to examine the bivariate relationships between the study variables using SPSS version 27. Structural equation modeling (SEM) was used to evaluate the hypothesized model, with the analysis conducted using AMOS version 24. The following fit indices were used to assess the model fit: χ^2 (Chi-square), df (Degrees of freedom), (χ^2/df), TLI (Tucker-Lewis Index), NFI (Normed Fit Index), CFI (Comparative Fit Index), and RMSEA (Root Mean Square Error of Approximation). Model fit was evaluated using established criteria, with a χ^2 value that is not statistically significant, a (χ^2/df) ratio less than 2, and fit indices (TLI, NFI, and CFI) greater than 0.90, indicating a good model fit. Additionally, an RMSEA value of less than 0.05 suggests a close fit between the model and the data (39).

Results

Participants in the study were 300 high school students aged 16 to 18 years. Eighty-five students (28.33%) were in the tenth grade, 114 (38.00%) in the eleventh grade, and 101 (36.67%) in the twelfth grade. Most of the students, 260 (86.67%), lived with both parents, while 40 (13.33%) lived with only one parent. The means, standard deviations (SD), and Pearson correlation coefficients for computer game addiction, empathy, emotion regulation difficulty, and aggression are reported in Table 1.

The findings revealed significant negative correlations between computer game addiction and other variables. Social empathy (r=-0.67, P<0.001), emotion regulation difficulty (r=0.56, P<0.001), and aggression (r=0.65, P<0.001) were all inversely associated with computer game addiction. Furthermore, social empathy (r=-0.51, P<0.001) and emotion regulation difficulty (r=0.34, P<0.001) were also significantly correlated with aggression (Table 1).

The adequacy of the hypothesized model was assessed using goodness-of-fit indices. As reported in Table 2, the Root Mean Square Error of Approximation (RMSEA) for the final model was 0.07, which indicates a good fit for the data. A visual representation of the research model is presented in Figure 1.

Table 3 presents the results of estimating the direct and indirect relationship path coefficients. The SEM analyses revealed significant associations between aggression and the study variables. Aggression demonstrated a positive standardized beta coefficient of 0.38 on emotion regulation difficulty, indicating that as aggression increases, so does emotion regulation difficulty (P<0.001). Conversely, aggression exhibited a negative standardized beta coefficient of -0.54 on empathy, suggesting that higher levels of aggression are associated with lower levels of social empathy (P<0.001). Additionally, aggression displayed a positive standardized beta coefficient of 0.27 on computer game addiction, implying that increased aggression leads to increased computer game addiction (P<0.001).

Table 2: Fit indicators of the model

Fit indicators	χ^2	df	(χ^2/df)	TLI	NFI	CFI	RMSEA
Model	79.15	39	2.03	0.98	0.91	0.93	0.07

χ^2: Chi-square, df: Degrees of freedom, TLI: Tucker-Lewis Index, NFI: Normed Fit Index, CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation
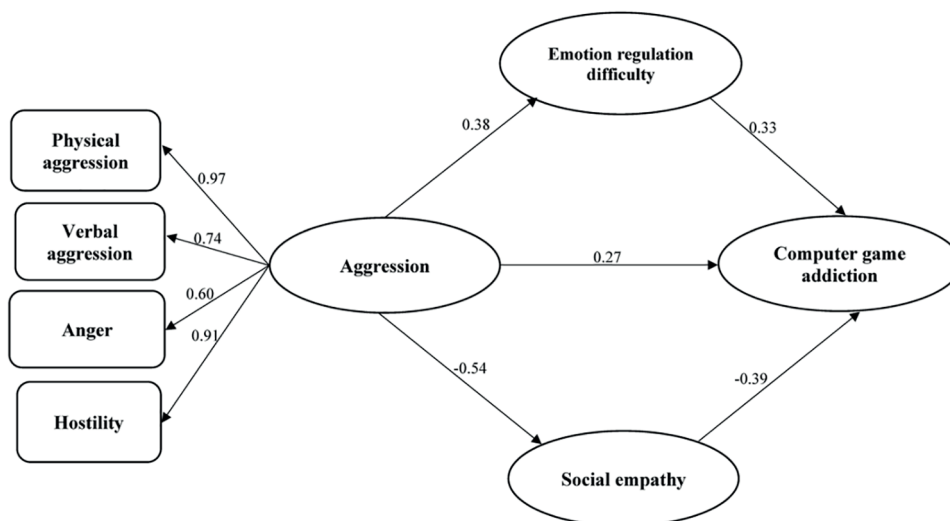

Figure 1: The mediating role of emotion regulation difficulty and social empathy in the relationships between aggression and video game addiction

Table 3: Direct and indirect paths in the final model

Paths	Model	
	β	P
Aggression → Emotion regulation difficulty	0.38	0.001
Aggression → Empathy	-0.54	0.001
Aggression → Computer game addiction	0.27	0.001
Social empathy → Computer game addiction	-0.39	0.001
Emotion regulation difficulty → Computer game addiction	0.33	0.001
Aggression → Computer game addiction through empathy	0.21	0.001
Aggression → Computer game addiction through emotion regulation difficulty	0.13	0.001

The findings also revealed significant relationships between social empathy and computer game addiction, as well as between emotion regulation difficulty and computer game addiction. Social empathy exhibited a negative standardized beta coefficient of -0.39 on computer game addiction, indicating that higher levels of social empathy are associated with lower levels of computer game addiction (P<0.001). Emotion regulation difficulty, on the other hand, demonstrated a positive standardized beta coefficient of 0.33 on computer game addiction, suggesting that increased emotion regulation difficulty leads to increased computer game addiction (P<0.001).

The mediation analysis examined the indirect effect of aggression on computer game addiction through social empathy and emotion regulation difficulty. The results indicated that the indirect impact of aggression on computer game addiction was significant (P<0.001) (Table 3). This suggests that aggression indirectly influences computer game addiction through its negative effect on social empathy and positive impact on emotion regulation difficulty.

Discussion

This study investigated the mediating roles of emotion regulation difficulty and social empathy in the relationships between aggression and video game addiction among students. The results revealed significant associations between aggression and the other variables investigated in this study. We found that higher levels of aggression were linked to both increased difficulties in regulating emotions and lower levels of empathy. Additionally, individuals with higher

levels of aggression exhibited a greater propensity for computer game addiction. The findings also demonstrated significant relationships between empathy, emotion regulation difficulty, and computer game addiction.

Our findings are in the same line with previous research on the relationship between aggression, emotion regulation difficulties, and empathy (22). For example, Navas-Casado et al. (22) have found that individuals with higher levels of aggression tend to have difficulty regulating their emotions, particularly anger and frustration. Similarly, Lo Cricchio et al. (27) demonstrated a negative association between empathy and aggression, suggesting that individuals with higher levels of empathy are less likely to engage in aggressive behavior. Furthermore, our study extends existing research by examining the relationship between computer game addiction and these variables. While previous studies have explored the link between video game addiction and aggression (21), our findings provide additional evidence for the role of emotion regulation difficulties and empathy in mediating this relationship. In comparison to Navas-Casado et al. (22), our study found a stronger association between emotion regulation difficulties and aggression, suggesting that difficulties in managing emotions may be a particularly important factor in predicting aggressive behavior among individuals with computer game addiction. However, our findings also highlight the importance of empathy in mitigating the effects of computer game addiction on aggression, which aligns with the findings of (40).

Higher empathy was associated with a lower likelihood of computer game addiction, while those who struggled with regulating their emotions were more likely to exhibit addictive behavior towards computer games. The mediation analysis explored the indirect effects of aggression on computer game addiction, considering social empathy and emotion regulation difficulty as potential mediating variables. Results indicated a significant indirect effect, suggesting that aggression influences computer game addiction not only directly but also indirectly through its impact on these other variables. Specifically, aggression appears to indirectly increase computer game addiction by both reducing social empathy and exacerbating difficulties in

managing emotions.

Our findings reveal a significant interplay between aggression, emotion regulation, and empathy. Individuals with difficulties in emotion regulation, particularly regarding intense negative emotions like anger and frustration, exhibit a heightened propensity for aggressive behavior. This association is understandable. When one is overwhelmed by emotions, his/her cognitive control can become impaired, leading to impulsive and potentially destructive actions. Aggression, in this context, might be perceived as a maladaptive coping mechanism to address the overwhelming emotional state (15). Additionally, the study demonstrates a negative correlation between social empathy and aggression. Empathy, the ability to understand and share the emotional experiences of others, fosters prosocial behavior and discourages aggression (27). When social empathy is diminished, it becomes difficult to appreciate the emotional consequences of one's actions on others. This lack of perspective can contribute to aggressive behavior as the potential for causing emotional harm to go unrecognized. For instance, an individual struggling with both emotion regulation and social empathy might misinterpret a social interaction, leading to a disproportionately aggressive response due to their inability to manage their emotional response and understand the emotional impact on the other person.

The current study findings suggest a potential link between aggressive tendencies and a predisposition towards computer game addiction. Individuals exhibiting higher levels of aggression may be more susceptible to developing problematic gaming habits. Video games can offer an immersive and stimulating environment that provides temporary relief from negative emotions. For individuals struggling with aggression, which can often stem from difficulties regulating emotions like anger or frustration, video games might become a maladaptive coping mechanism (21). The intense focus and engagement video games provide can serve as a means to escape overwhelming emotions, potentially leading to excessive gameplay as a means of managing emotional states. The aggressive nature of certain video games, particularly violent ones, has been a topic of debate. While some propose a cathartic effect, where players can release pent-up aggression in a virtual setting, others argue for

potential reinforcement (18). For individuals with pre-existing aggressive tendencies, violent video games might provide a platform to act out these impulses virtually. The in-game rewards and successes associated with aggressive behavior could reinforce these tendencies and contribute to a cycle of seeking out similar experiences within the game, potentially leading to addiction.

Our study identified a compelling interplay between empathy, emotion regulation difficulties, and computer game addiction. Individuals with higher levels of empathy and the ability to recognize and share the feelings of others displayed a lower propensity for developing problematic gaming habits (28). This association likely stems from the prosocial influence of empathy. When we can understand and connect with the emotions of others, it fosters positive social interactions and discourages behaviors that might cause harm. In the context of video games, excessive or addictive use can negatively impact relationships and daily functioning. Empathy acts as a protective factor, encouraging individuals to prioritize real-world connections and activities over potentially detrimental gaming habits.

Conversely, the study revealed a positive correlation between difficulties in emotion regulation and computer game addiction. When individuals struggle to manage their emotions, particularly negative emotions like frustration or boredom, they are more susceptible to seeking alternative coping mechanisms. Video games can offer an enticing escape from negative emotional states (8). The immersive and stimulating nature of games can provide a temporary reprieve from emotional discomfort. However, this escapism can morph into problematic behavior if used excessively to regulate emotions. The readily available emotional regulation video games might hinder the development of healthier coping mechanisms, potentially leading to a cycle of dependence on gaming to manage emotional states.

The analysis suggests that aggression fosters a heightened risk for computer game addiction, in part, by diminishing empathy. Individuals with higher levels of aggression may struggle to understand and share the emotional experiences of others. This lack of empathy can lead to prioritization of self-serving behaviors, potentially including excessive video game use. Since excessive gaming can negatively impact

relationships and social interactions, individuals with lower empathy might be less deterred by the potential consequences on others. Furthermore, the analysis indicates that aggression indirectly increases computer game addiction by exacerbating difficulties in emotion regulation. Individuals prone to aggression often struggle to manage intense emotions like anger or frustration. Video games can offer a readily accessible escape from these overwhelming emotional states. The immersive and stimulating environment of games can provide temporary relief, potentially leading to their excessive use as a primary coping mechanism. This reliance on video games for emotional regulation hinders the development of healthier coping strategies, creating a cycle where individuals increasingly turn to games to manage their emotions, ultimately contributing to addiction.

This study had some limitations. First, the design cannot definitively show cause and effect, only relationships between the variables. Second, the focus on Iranian high school students limits generalizability to other cultures and populations. Third, self-reported data can be inaccurate due to potential bias and the difficulty of self-assessing complex concepts.

Conclusion
This study investigated the relationship between aggression, video game tendency, emotion regulation difficulty, and social empathy in high school students. The findings revealed significant positive correlations between aggression and video game tendency, as well as aggression and emotion regulation difficulty. Conversely, a negative correlation was observed between aggression and social empathy. These results partially support the "sensitization-effect" model, suggesting that higher aggression is associated with a greater tendency to engage in video games. Furthermore, the study employed structural equation modeling to examine the mediating role of emotion regulation difficulty and social empathy. The analysis supported the hypothesized mediation, indicating that the influence of aggression on video game addiction is partially explained by its impact on these psychological factors. Students with higher levels of aggression may struggle to regulate their emotions effectively (increased difficulty) and may exhibit lower social empathy. These factors,

in turn, may contribute to a greater tendency to engage in video games. These findings highlight the complex interplay between aggression, emotional regulation, social cognition, and video game use in adolescents.

Implications and Future Research

The findings of this study have important implications for educational practices, parental guidance, and the development of interventions to address aggressive behavior in adolescents. By understanding the relationships between video game habits, emotion regulation difficulties, and social empathy, educators and parents can implement strategies to promote positive outcomes and mitigate potential negative consequences. Future research should explore the potential causal nature of the relationships identified in this study. Longitudinal studies that track changes in video game habits, emotion regulation, social empathy, and aggression over time can help to establish stronger causal links. Additionally, investigating the role of other factors, such as peer influence, family dynamics, and individual differences, can provide a more comprehensive understanding of the complex interplay of these variables. Furthermore, this study highlights the importance of interventions that promote emotional regulation and social skills development. Educators and parents can implement programs and activities that teach adolescents effective strategies for managing emotions, resolving conflicts peacefully, and developing empathy. By fostering these skills, it may be possible to mitigate the potential negative consequences of video game use for adolescents with higher levels of aggression.

Ethical Approval

The study protocol was approved (cod: IR.PNU.REC.1401.456) by the Ethics Committee of Payame Noor University, Tehran, Iran.

Funding

This study was self-funded.

Conflict of Interest

There are no conflicts of interest.

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