

Examining the Predictive Role of Computer Game Use, Impulse Control, and Quality of Family Relationships in the Occurrence of High-Risk Behaviors Among Upper Secondary School Students

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ABSTRACT

High-risk behaviors during adolescence constitute a major mental health challenge and are influenced by multiple factors. The present study aimed to examine the predictive roles of computer game use, impulsivity, and the quality of family relationships in the occurrence of high-risk behaviors among students. This descriptive-correlational study was conducted with 200 upper secondary school students. Data were collected using the Iranian Adolescents Risk-Taking Scale, the Barratt Impulsiveness Scale, the Family Adaptability and Cohesion Evaluation Scale, and the Computer Game Addiction Questionnaire and were analyzed using Pearson's correlation coefficient and multiple regression analysis. Findings: The results indicated significant positive relationships between computer game use and high-risk behaviors and between impulsivity and high-risk behaviors ($p < .01$). In contrast, the quality of family relationships was significantly and negatively associated with high-risk behaviors. The regression model showed that the independent variables collectively explained 31.4% of the variance in high-risk behaviors ($p < .01$). Furthermore, excessive computer game use significantly increased the likelihood of being classified at a high level of high-risk behaviors. The findings highlight the protective role of the family and the detrimental effects of excessive involvement in computer games and poor impulse control on the occurrence of high-risk behaviors. Therefore, the development of school-based preventive interventions focusing on self-control skills and enhancement of the emotional climate of the family appears necessary.

Keywords: high-risk behaviors, computer games, impulsivity, impulse control, quality of family relationships.

1. Introduction

Adolescence is a developmental period characterized by substantial biological, cognitive, emotional, and

social changes that can simultaneously create opportunities for growth and increase vulnerability to maladaptive patterns of behavior. During this stage, adolescents gradually acquire greater independence from parents, spend more time with

peers, encounter novel social contexts, and become increasingly exposed to situations that require autonomous decision-making. At the same time, the maturation of cognitive control systems does not always occur at the same pace as heightened sensitivity to novelty, reward, social approval, and emotional stimulation. This developmental imbalance can increase adolescents' propensity to engage in behaviors with potentially harmful consequences. High-risk behaviors may encompass substance use, smoking, alcohol consumption, aggression, unsafe sexual behavior, dangerous driving, self-harm, and other actions that jeopardize physical, psychological, educational, or social well-being. Research indicates that adolescent risk-taking is not attributable to a single cause but emerges from the interaction of individual characteristics, family processes, peer influences, emotional functioning, and broader developmental environments (Gelmez Burakgazi, 2024; Pruitt, 2023). Studies conducted among secondary school students have similarly shown that individual, familial, and peer-related factors contribute to differences in adolescents' tendency toward risky behaviors, highlighting the need for multidimensional explanatory models rather than approaches focusing on only one risk factor (Abedi Parija & Sadeghi, 2022).

Among individual psychological factors, deficits in self-regulation and impulse control are particularly important for understanding adolescent high-risk behavior. Impulsivity generally refers to a tendency to respond rapidly to internal or external stimuli without sufficient consideration of possible negative consequences. It is a multidimensional construct that can include attentional or cognitive impulsivity, motor impulsivity, and non-planning tendencies. From a developmental psychopathology perspective, trait impulsivity is closely associated with the externalizing spectrum and may contribute to a broad range of maladaptive behaviors because highly impulsive individuals have greater difficulty inhibiting prepotent responses, delaying gratification, considering long-term outcomes, and modifying behavior in response to potential consequences (Beauchaine et al., 2017). Empirical evidence among adolescents has further demonstrated that impulsivity is associated with risky behaviors and may operate in conjunction with other psychological processes, including delay discounting, brain-behavioral systems, and difficulties in emotion regulation (Alizadeh et al., 2023). Emotional dysregulation and related deficits in psychological adjustment have also been identified as predictors of adolescents' tendency toward risky behavior, particularly

when the individual has limited capacity to manage distress or respond assertively to challenging interpersonal situations (Mina & Aminimanesh, 2021). Thus, poor impulse control may function as a proximal psychological mechanism through which adolescents translate emotional arousal, reward sensitivity, or environmental pressure into immediate high-risk actions.

The relevance of impulse control has become even more prominent in the context of adolescents' rapidly expanding engagement with digital media and electronic games. Computer and online gaming are now common leisure activities among adolescents, and gaming itself is not inherently pathological. Games can provide entertainment, social interaction, challenge, and opportunities for mastery. Nevertheless, excessive or poorly controlled gaming can become problematic when it begins to interfere with academic performance, family interactions, sleep, emotional health, social functioning, or everyday responsibilities. Early research on online gaming addiction among children and adolescents identified problematic gaming as a behavioral pattern involving preoccupation, loss of control, tolerance, withdrawal-like experiences, and persistence despite adverse consequences (Kuss & Griffiths, 2012). Subsequent neurobiological and behavioral research has suggested that problematic gaming may involve reward-processing, motivational, and executive-control mechanisms similar in some respects to those implicated in other addictive behaviors (Weinstein & Lejoyeux, 2015). The Interaction of Person-Affect-Cognition-Execution model further proposes that specific internet-use disorders develop through dynamic interactions among personal predispositions, affective and cognitive responses, reward expectancies, coping processes, and executive functions, providing a useful theoretical framework for understanding why only some adolescents develop maladaptive gaming patterns despite widespread exposure to games (Brand et al., 2016). More recent efforts to develop adolescent-specific measures of problematic gaming likewise reflect growing recognition that the severity and functional consequences of gaming behavior should be assessed developmentally rather than merely by the amount of time spent playing (Liu & Xie, 2025).

Evidence increasingly suggests that problematic gaming is related to a broad constellation of psychosocial difficulties in adolescents. Gaming disorder has been associated with emotional, behavioral, social, and functional problems, although the direction and strength of these relationships can vary according to individual and contextual factors (Rani et al., 2025). Iranian studies have also drawn attention to the

possible behavioral and educational consequences of extensive computer game use among students. Computer gaming has been examined in relation to students' behavior and academic performance, indicating that the intensity and pattern of gaming may be relevant to educational and behavioral adjustment (Jalali, 2023). Other findings have specifically reported an association between computer game use and aggressive behavior among adolescents, suggesting that problematic involvement may coexist with externalizing difficulties (Joukar et al., 2023). Online gaming dependence has additionally been associated with social anxiety in adolescents, indicating that problematic gaming may not be restricted to overt behavioral difficulties but may also be embedded in broader emotional and interpersonal problems (Habibzadeh & Ghorban Shiroudi, 2022). During the COVID-19 pandemic, changes in daily routines, school attendance, social contact, and screen exposure were also accompanied by concerns regarding increased gaming addiction among children and adolescents, further emphasizing the importance of environmental circumstances in shaping problematic gaming behavior (Han et al., 2022).

An important question is why problematic gaming and high-risk behaviors may become linked in some adolescents. One plausible explanatory pathway involves impulsivity and impaired inhibitory control. Adolescents who have difficulty delaying gratification or suppressing immediate responses may be more vulnerable both to persistent gaming and to other behaviors characterized by immediate reward despite possible long-term costs. Recent research has identified impulsivity as a predictor of both risk behaviors and problematic media use in adolescence, supporting the possibility of a common self-regulatory vulnerability across these domains (Kaptanovic, 2024). Impulsivity and aggression have also been identified as risk factors for Internet Gaming Disorder, further connecting problematic gaming to externalizing characteristics (Hammad & Al-Shahrani, 2024). Factor-analytic research on impulsivity in gaming disorder and Internet Gaming Disorder has reinforced the importance of distinguishing different facets of impulsivity when examining problematic gaming (Raybould & Tunney, 2024). Similarly, low self-control has been associated with Internet Gaming Disorder symptoms and impaired functioning, with protective psychological factors such as meaning in life potentially modifying this association (Fong et al., 2024). Experimental evidence from the broader problematic digital-media literature additionally suggests that excessive problematic media use may be associated with impaired response inhibition, supporting the

idea that difficulties in inhibitory control may both predispose individuals to and be aggravated by dysregulated digital engagement (Gou et al., 2024).

The overlap between impulsivity, attention problems, aggression, and problematic gaming is especially relevant during adolescence because executive control systems continue to develop across this period. A recent review examining problematic Internet use and Internet Gaming Disorder among adolescents with attention-deficit/hyperactivity disorder has highlighted the importance of inattention, hyperactivity, impulsivity, and related self-regulatory deficits in understanding vulnerability to problematic digital behavior (Ghiaccio et al., 2025). Longitudinal evidence likewise indicates reciprocal or co-occurring associations among gaming disorder symptoms, hyperactivity/inattention symptoms, and aggression, suggesting that problematic gaming may form part of a broader developmental pattern of behavioral dysregulation rather than functioning as an isolated phenomenon (Chen et al., 2025). Reward sensitivity may also contribute to these processes. Adolescents with Internet Gaming Disorder may show altered sensitivity to monetary and social rewards, which is particularly important during a developmental period in which motivational systems and social incentives exert strong effects on behavior (Wang et al., 2024). Taken together, these findings suggest that high computer game involvement and poor impulse control may represent interrelated vulnerabilities that increase adolescents' likelihood of making rapid, reward-oriented decisions with insufficient consideration of harmful consequences.

Individual predispositions, however, unfold within interpersonal systems, and the family represents one of the most influential developmental contexts during adolescence. Ecological approaches to human development emphasize that behavior emerges through continuous interactions between the developing individual and multiple environmental systems, with the family serving as a proximal environment that can either buffer or amplify developmental risk (Gelmez Burakgazi, 2024). Family cohesion, adaptability, communication, emotional closeness, parental monitoring, and supportive relationships may provide adolescents with emotional security, clear behavioral boundaries, opportunities for co-regulation, and assistance in coping with stress. Conversely, conflict, weak communication, inconsistent parenting, emotional distance, and family dysfunction may increase susceptibility to maladaptive coping strategies and risky behaviors. Iranian research has found that family cohesion and adolescents'

sense of self-worth contribute to predicting the tendency toward risky behaviors, underscoring the protective significance of close and supportive family relationships (Arabnejad et al., 2018). Family communication patterns have also been linked to adolescent risky behaviors through emotional security, suggesting that the family environment may influence behavior partly by shaping adolescents' sense of interpersonal safety and psychological stability (Sarvari et al., 2023). During periods of widespread stress such as the COVID-19 pandemic, family support has similarly been associated with adolescents' emotional health and risk behaviors, further illustrating the buffering role that family relationships may play under adverse circumstances (Shapiro et al., 2022).

Family functioning may also be closely related to adolescents' gaming behavior. Problematic media use does not occur independently of family processes; rather, patterns of parental involvement, communication, monitoring, conflict, and emotional connection may influence how adolescents use media and how likely such use is to become dysregulated (Coyne & Stockdale, 2018). Systematic reviews have identified multiple familial protective and risk factors associated with Internet Gaming Disorder among children and adolescents, indicating that family climate, parenting practices, parental relationships, and family functioning are important correlates of problematic gaming (Ergin & Essau, 2025; Petrescu et al., 2025). Longitudinal research has further shown that parenting practices are associated with problematic gaming and other online behavioral problems, including cyberaggression, suggesting that family influences may extend simultaneously across several forms of digital risk (Pivetta et al., 2024). Parent-child emotional closeness has likewise been examined longitudinally in relation to adolescent gaming, supporting the importance of considering the quality of the parent-adolescent relationship rather than focusing exclusively on gaming frequency (Boson et al., 2024). In addition, within-person longitudinal analyses have suggested a potentially reciprocal relationship between family dysfunction and problematic gaming, with factors such as self-concept clarity helping explain how difficulties in one domain may reinforce problems in the other over time (Zhou et al., 2023).

The quality of family relationships may be particularly important because cohesive and adaptable families are better positioned to respond constructively to developmental transitions, changing adolescent needs, academic demands, peer pressures, and increased autonomy. Family cohesion reflects emotional connection and a sense of belonging

among family members, whereas adaptability or flexibility reflects the capacity of the family system to modify roles, rules, and patterns of interaction when circumstances change. Research on families with adolescents has shown that family functioning is meaningfully related to temporal balance and family cohesion and adaptability, suggesting that effective family functioning requires both emotional connectedness and flexibility in managing developmental demands (Oyanadel et al., 2023). Broader research on inhibition and emotional symptoms has also shown that the consequences of self-regulatory characteristics can differ as a function of familial risk, indicating that family context may moderate the developmental impact of individual vulnerabilities (Stevens et al., 2023). In the specific context of online gaming, cognitive distortions and parenting styles have been identified as predictors of gaming addiction among students, further supporting the view that problematic gaming develops through interactions between individual cognitive-personality characteristics and family experiences (Zandi & Mirzaei Doustan, 2019). These findings are consistent with a transactional perspective in which adolescents influence and are influenced by their family environments over time.

Despite the growing literature on adolescent risk behavior, impulsivity, family functioning, and problematic gaming, several issues remain important. First, many studies have examined these variables separately, although contemporary developmental models suggest that adolescent behavior is better understood by considering interacting individual and contextual influences. Second, problematic gaming may function both as a behavioral problem in its own right and as a marker of broader self-regulation difficulties, making it important to examine its association with other forms of high-risk behavior alongside impulsivity. Third, the family may provide a protective context capable of attenuating behavioral vulnerabilities, but family functioning is often conceptualized narrowly through isolated parenting behaviors rather than through broader dimensions such as cohesion and adaptability. Finally, culturally specific evidence remains necessary because adolescents' gaming practices, family relationships, social expectations, and opportunities for risk-taking vary across sociocultural settings. Findings from Iranian adolescents indicate that risky behaviors are associated with individual and family variables (Abedi Parija & Sadeghi, 2022; Arabnejad et al., 2018), while national studies also point to relationships between gaming, aggression, social anxiety, parenting characteristics, and behavioral functioning

(Habibzadeh & Ghorban Shiroudi, 2022; Joukar et al., 2023; Zandi & Mirzaei Doustan, 2019). Integrating these lines of evidence may therefore provide a more comprehensive understanding of which adolescents are most vulnerable to high-risk behaviors and which family resources may serve a protective role.

Accordingly, the present study aimed to examine the predictive roles of computer game use, impulse control/impulsivity, and the quality of family relationships in the occurrence of high-risk behaviors among upper secondary school students in District 1 of Shiraz.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a descriptive-correlational research design. The theoretical framework and research background were developed through library research, including the examination of scholarly articles and relevant websites, while data were collected to test the research hypotheses. The data for the present study were obtained through both library research and questionnaire administration. The statistical population consisted of all 15,000 male and female upper secondary school students in District 1 of Shiraz who were enrolled in public and non-governmental schools during the 2025–2026 academic year. The study population included students in Grades 10, 11, and 12 across different academic disciplines. Given that these students were undergoing the sensitive developmental period of adolescence and encountering developmental challenges related to the variables investigated in this study, they were selected as the target population. In the present study, 200 participants were selected through purposive sampling based on the inclusion criteria, the characteristics of the target population, and the Krejcie and Morgan sample size table. (The sample size should be specified according to the population size.) Data were analyzed using simultaneous multiple regression analysis in SPSS version 26. All stages of the study were conducted in full accordance with ethical considerations and professional research principles. First, parental participation was entirely voluntary, and before participation in the study, the research objectives, procedures for completing the instruments, and manner in which the data would be used were clearly explained to them. Subsequently, informed consent was obtained to ensure that participation was undertaken with full awareness and without coercion or pressure. During data collection, participants were assured that their responses would remain

strictly confidential and that no names or personally identifying information would be included in reports or results. All data were analyzed anonymously and reported only in aggregate and group-level form. Participants were also permitted to withdraw from the study at any stage without any negative consequences. The principle of respect for participants' rights was observed throughout all stages of the research, and participants were not exposed to psychological harm or pressure because all instruments were questionnaire-based and noninvasive.

2.2. Measures

To assess the criterion variable in the present study, the Iranian Adolescents Risk-Taking Scale, developed and validated by Mohammadkhani (2010), was used. This specialized instrument was developed to assess adolescents' readiness and tendency to engage in various forms of risk-taking behavior and consists of 38 items rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire is structured to assess seven major domains of maladaptive and high-risk behavior, including tendency toward illicit drug use, cigarette smoking patterns, alcohol misuse, violent behaviors, high-risk sexual behaviors, risky driving, and suicidal or self-harming tendencies. Higher scores on the scale indicate a greater predisposition toward and vulnerability to harmful and high-risk behaviors. In examining the psychometric properties of the instrument, Mohammadkhani (2010) reported satisfactory content and construct validity based on factor analysis. Cronbach's alpha was reported as .94 for the total scale and ranged from .74 to .93 for the seven subscales, indicating very high internal consistency and reliability of the instrument among Iranian students. In the present study, in which the data were collected through online platforms, Cronbach's alpha for the total scale was .92.

The 11th version of the Barratt Impulsiveness Scale was used to assess the construct of impulsivity. The instrument was developed by Barratt et al. (2004) and is recognized as one of the most widely used self-report measures in clinical psychology and neuroscience for assessing personality characteristics associated with impulsive behavior. The scale consists of 30 items rated on a four-point Likert scale ranging from 1 (never/rarely) to 4 (almost always). Some items are reverse-scored to improve the accuracy of respondents' answers. The questionnaire is organized around three major dimensions: cognitive impulsivity, reflecting instability in attention and concentration; motor

impulsivity, reflecting acting without forethought; and non-planning impulsivity, reflecting a lack of future orientation. In Iran, the psychometric properties of this scale were examined by Ekhtiari et al. (2008), who confirmed its reliability through internal consistency, reporting a Cronbach's alpha coefficient of .84 for the total scale. The construct validity of the instrument was also confirmed through factor analysis, demonstrating its scientific adequacy for use among student and adolescent populations. In the present study, following online data collection, Cronbach's alpha for the overall scale was estimated at .84.

To assess the quality of family relationships, the Family Adaptability and Cohesion Evaluation Scale was used. This instrument, developed by Olson and colleagues, is known in the psychological literature as the Family Adaptability and Cohesion Evaluation Scale and is based on Olson's Circumplex Model. Its purpose is to characterize patterns of interaction within the family system. The questionnaire consists of 20 items assessing two key dimensions: cohesion, referring to emotional bonding and the degree of closeness among family members, and adaptability/flexibility, referring to the family's ability to modify its power structure, roles, and relational rules in response to developmental challenges. Each dimension is assessed using 10 items rated on a five-point Likert scale ranging from 1 (never) to 5 (always). Higher scores on each subscale indicate more desirable levels of interaction and adaptability within the family context. The psychometric properties of the instrument have been supported in numerous national and international studies, with Cronbach's alpha coefficients ranging from .78 to .84 for the cohesion and adaptability dimensions, indicating satisfactory reliability of the scale among student populations. In the present study, Cronbach's alpha for the overall questionnaire was .86.

To assess the degree of dependence on computer games and maladaptive patterns of computer game use, the specialized questionnaire developed by Wang and Chang (2002) was administered. This scale was designed to identify levels of behavioral addiction to gaming among adolescents and consists of 20 items. Responses are rated on a five-point Likert scale ranging from 1 (not at all) to 5 (very much), with

higher scores indicating greater severity of computer game dependence. The questionnaire assesses four major dimensions: compulsion and urge to play, withdrawal symptoms, tolerance, and gaming-related problems in daily life and health. In the present study, the reliability of the questionnaire was confirmed with a Cronbach's alpha coefficient of .89.

2.3. Data Analysis

To collect quantitative data on the study variables at the field level, questionnaires were administered to obtain raw data. The raw data were analyzed using SPSS and appropriate statistical techniques at both descriptive and inferential levels. At the descriptive level, indices such as the mean and standard deviation of scores were calculated. At the inferential level, Pearson's correlation coefficient and regression analysis were used to test the research hypotheses.

3. Findings and Results

Based on the results, of the 200 participants in the study, 105 (52.5%) were female and 95 (47.5%) were male. Of the 200 students examined, 64 (32.0%) were in Grade 10, 67 (33.5%) were in Grade 11, and 69 (34.5%) were in Grade 12. Regarding academic discipline, 69 students (34.5%) were studying experimental sciences, 61 (30.5%) humanities, 46 (23.0%) mathematics and physics, and 24 (12.0%) technical and vocational education.

As shown in Table 1, the mean computer game addiction score among participants was 52.49 (SD = 14.52). The mean score for cognitive impulsivity was 16.62 (SD = 3.98), the mean score for motor impulsivity was 24.34 (SD = 5.57), and the mean score for non-planning impulsivity was 24.00 (SD = 4.89). The mean total impulsivity score was 64.97 (SD = 14.06). The mean family cohesion score was 33.56 (SD = 6.81), and the mean family adaptability score was 31.49 (SD = 6.42). The mean total family functioning score was 65.05 (SD = 13.08). The mean high-risk behavior score among the study participants was 70.78 (SD = 18.57).

Table 1*Means and Standard Deviations of the Study Variables*

Variable	N	Mean	SD	Variance	Minimum	Maximum
Cognitive impulsivity	200	16.62	3.98	15.88	8	31
Motor impulsivity	200	24.34	5.57	31.13	11	44
Non-planning impulsivity	200	24.00	4.89	23.97	11	40
Total impulsivity score	200	64.97	14.06	197.83	30	115
Family cohesion	200	33.56	6.81	46.48	15	50
Family adaptability	200	31.49	6.42	41.27	16	50
Total family functioning score	200	65.05	13.08	171.08	32	100
High-risk behaviors	200	70.78	18.57	345.03	38	114
Computer game addiction	200	52.49	14.52	211.11	20	95

Table 2 presents the Pearson correlation coefficients examining the relationships among the study variables. The results showed a significant positive correlation between computer game addiction and impulsivity, $r = .533$, $p < .01$. A significant positive correlation was also observed between computer game addiction and high-risk behaviors, $r = .478$, $p < .01$. In contrast, computer game addiction was significantly and negatively correlated with family

functioning, $r = -.381$, $p < .01$. Furthermore, impulsivity was significantly and positively associated with high-risk behaviors, $r = .351$, $p < .01$, and significantly and negatively associated with family functioning, $r = -.273$, $p < .01$. A significant negative relationship was also found between high-risk behaviors and family functioning, $r = -.438$, $p < .01$.

Table 2*Pearson Correlation Matrix Among the Study Variables*

Variable	1	2	3	4
1. Computer game addiction	1	.533**	.478**	-.381**
2. Impulsivity	.533**	1	.351**	-.273**
3. High-risk behaviors	.478**	.351**	1	-.438**
4. Family functioning	-.381**	-.273**	-.438**	1

The results presented in Table 3 show the regression coefficients for predicting high-risk behaviors based on impulsivity. The findings indicate that impulsivity had a positive and statistically significant effect on high-risk

behaviors, with a standardized regression coefficient of $\beta = .351$, $p < .01$. Therefore, as impulsivity increases, the level of high-risk behaviors also increases.

Table 3*Regression Coefficients for Predicting High-Risk Behaviors Based on Impulsivity*

Variable	B	SE	β	t	p
Constant	40.624	5.840	—	6.956	< .001
Impulsivity	.464	.088	.351	5.283	< .001

Table 4*Regression Coefficients for Predicting High-Risk Behaviors Based on Computer Game Addiction*

Variable	B	SE	β	t	p
Constant	38.686	4.345	—	8.903	< .001
Computer game addiction	.611	.080	.478	7.662	< .001

Table 5

Regression Coefficients for Predicting High-Risk Behaviors Based on Family Functioning

Variable	B	SE	β	t	p
Constant	111.272	6.019	—	18.487	< .001
Quality of family relationships	-.622	.091	-.438	-6.862	< .001

Table 6

Regression Coefficients for Predicting Computer Game Addiction Based on the Quality of Family Relationships

Variable	B	SE	β	t	p
Constant	80.028	4.843	—	16.525	< .001
Quality of family relationships	-.423	.073	-.381	-5.798	< .001

According to the results presented in Table 4, the standardized regression coefficient (β) for computer game addiction was .478 and was statistically significant at the .01 level. The positive coefficient indicates a direct relationship between these two variables; that is, as computer game addiction increases, the level of high-risk behaviors also increases.

According to the results presented in Table 5, the standardized regression coefficient for family functioning was $\beta = -.438$ and was statistically significant at the .01 level. The negative coefficient indicates an inverse relationship, meaning that as family functioning improves and family health scores increase, the level of high-risk behaviors decreases. Therefore, the third subsidiary hypothesis of the study was supported.

According to the results presented in Table 6, the standardized regression coefficient (β) for the quality of family relationships was $-.381$ and was statistically significant at $p < .001$. The negative coefficient indicates an inverse relationship between the two variables; in other words, improvement in the quality of family relationships is associated with lower levels of computer game addiction among students. Furthermore, based on the unstandardized regression coefficient (B), each one-unit increase in the quality of family relationships was associated with an average decrease of .423 units in the computer game addiction score.

4. Discussion

The present study examined the predictive roles of computer game addiction, impulsivity, and the quality of family relationships in high-risk behaviors among upper secondary school students in District 1 of Shiraz. The findings demonstrated that computer game addiction and impulsivity were positively and significantly associated with

high-risk behaviors, whereas family functioning was negatively and significantly associated with such behaviors. More specifically, computer game addiction showed a moderate positive correlation with high-risk behaviors ($r = .478, p < .01$), and impulsivity was also positively correlated with high-risk behaviors ($r = .351, p < .01$). In contrast, family functioning was negatively correlated with high-risk behaviors ($r = -.438, p < .01$). The regression analyses further showed that impulsivity positively predicted high-risk behaviors ($\beta = .351$), computer game addiction positively predicted high-risk behaviors ($\beta = .478$), and the quality of family relationships negatively predicted high-risk behaviors ($\beta = -.438$). Furthermore, the overall predictive model indicated that the independent variables explained approximately 31.4% of the variance in high-risk behaviors. The findings therefore support the assumption that adolescent risk-taking is associated with a combination of individual self-regulatory vulnerabilities, problematic patterns of digital engagement, and the quality of the family environment.

The finding that greater impulsivity was associated with higher levels of high-risk behavior is consistent with a substantial body of developmental and clinical research. Impulsivity involves a tendency to act rapidly without adequately considering possible consequences and is commonly associated with insufficient behavioral inhibition, preference for immediate rewards, weak future orientation, and difficulty delaying gratification. Such characteristics are directly relevant to many forms of adolescent risk-taking, in which an immediate emotional, social, or rewarding outcome may outweigh consideration of delayed negative consequences. Beauchaine et al. emphasized the central position of trait impulsivity within the externalizing spectrum and showed that impulsivity represents a transdiagnostic vulnerability to multiple forms

of dysregulated and maladaptive behavior (Beauchaine et al., 2017). Similarly, research among adolescents has demonstrated that impulsivity is significantly associated with risky behaviors and can operate in interaction with reward sensitivity, delay discounting, and emotion-regulation difficulties (Alizadeh et al., 2023). The present finding is also consistent with evidence indicating that impulsivity predicts adolescent risk behaviors and problematic media engagement (Kaptanovic, 2024).

One explanation for this finding concerns the developmental imbalance between motivational and inhibitory systems during adolescence. Adolescents are often highly sensitive to reward, novelty, emotional stimulation, and peer-related incentives while the executive functions required for response inhibition and long-term planning are still developing. Under such circumstances, adolescents characterized by greater impulsivity may be particularly likely to make decisions based on immediate reinforcement rather than delayed costs. This interpretation is compatible with evidence showing that social rewards and punishments can alter the association between social norms and adolescent risk-taking (Pruitt, 2023). It is also consistent with research demonstrating that difficulties in emotional regulation, differentiation, and assertiveness are related to adolescent risky behaviors (Mina & Aminimanesh, 2021). Thus, impulsivity may not simply represent acting quickly; rather, it may reflect a broader weakness in self-regulatory processes that makes it more difficult for adolescents to tolerate emotional arousal, resist social pressures, inhibit rewarding but harmful actions, and evaluate future consequences.

The positive predictive role of computer game addiction in high-risk behaviors was another important finding. Students reporting higher levels of problematic gaming also reported significantly higher levels of high-risk behaviors, and computer game addiction showed the strongest positive standardized coefficient among the positive predictors examined separately. This finding is compatible with previous evidence demonstrating associations between problematic gaming and a range of psychological and behavioral difficulties among adolescents. Reviews of gaming addiction have indicated that uncontrolled gaming may be accompanied by impaired functioning, psychological distress, interpersonal problems, and behavioral dysregulation (Kuss & Griffiths, 2012). More recent research has similarly identified associations between gaming disorders and multiple psychosocial difficulties among adolescents (Rani et al., 2025). Within Iranian

samples, computer game use has also been associated with changes in students' behavior and academic functioning (Jalali, 2023), while greater computer game involvement has been linked to aggression among adolescents (Joukar et al., 2023). Dependence on online gaming has additionally been associated with social anxiety, suggesting that excessive gaming may coexist with both externalizing and internalizing difficulties (Habibzadeh & Ghorban Shiroudi, 2022).

The association between problematic gaming and high-risk behavior may partly reflect common underlying self-regulatory mechanisms. According to models of behavioral addiction, problematic gaming is not determined merely by frequent exposure to games but develops when personal vulnerabilities interact with affective responses, reward expectancies, coping patterns, and executive-control processes. The I-PACE model specifically proposes that diminished inhibitory control can contribute to persistent and maladaptive engagement with rewarding digital activities (Brand et al., 2016). Neurobiological perspectives have similarly emphasized alterations in reward-related and control processes in Internet and videogame addiction (Weinstein & Lejoyeux, 2015). Recent evidence showing heightened or altered sensitivity to monetary and social rewards among adolescents with Internet Gaming Disorder further suggests that reward-processing mechanisms may contribute to persistent gaming despite negative consequences (Wang et al., 2024). Therefore, adolescents who are strongly driven by immediate reward and who experience difficulty inhibiting behavior may be vulnerable both to excessive gaming and to other high-risk activities.

The present findings concerning the relationship between gaming and impulsivity further support this interpretation. Computer game addiction was positively correlated with impulsivity ($r = .533$), indicating substantial overlap between dysregulated gaming and weak behavioral self-control. This result is in line with studies identifying impulsivity as a significant risk factor for Internet Gaming Disorder (Hammad & Al-Shahrani, 2024) and research demonstrating that specific dimensions of impulsivity are relevant to both gaming disorder and Internet Gaming Disorder (Raybould & Tunney, 2024). Low self-control has likewise been associated with greater gaming disorder symptoms and poorer functioning among adolescents (Fong et al., 2024). Evidence from broader problematic digital-media research also suggests that excessive problematic media use may be associated with deficits in response inhibition (Gou et al., 2024). Moreover, longitudinal

findings linking gaming disorder symptoms with hyperactivity/inattention and aggression indicate that problematic gaming may be embedded within a broader pattern of behavioral dysregulation (Chen et al., 2025). A recent review focusing on adolescents with attention-deficit/hyperactivity-related characteristics similarly highlighted impulsivity and impaired self-regulation as important correlates of problematic Internet use and gaming disorder (Ghiaccio et al., 2025). Collectively, these studies help explain why gaming addiction and high-risk behaviors may cluster within the same adolescents.

At the same time, the present findings should not be interpreted as indicating that computer gaming itself necessarily produces high-risk behavior. Gaming is a common recreational activity, and problematic outcomes are more likely to emerge when gaming becomes compulsive, poorly controlled, or functionally impairing. Recent measurement research has emphasized the importance of distinguishing problematic gaming from ordinary or intensive involvement by focusing on loss of control and negative consequences rather than solely on time spent playing (Liu & Xie, 2025). Environmental circumstances may also shape this relationship. For example, a systematic review examining the effects of the COVID-19 pandemic documented changes in gaming addiction among children and adolescents during a period marked by social restrictions, disruption of routines, and increased digital engagement (Han et al., 2022). Thus, excessive gaming may sometimes represent both a manifestation of pre-existing vulnerabilities and a behavioral context through which those vulnerabilities are reinforced.

Another major finding was the negative association between family functioning and high-risk behaviors. Higher family functioning was associated with lower levels of adolescent high-risk behavior, and the quality of family relationships significantly and negatively predicted high-risk behaviors. This finding is consistent with previous research emphasizing the protective role of supportive, cohesive, and well-functioning family environments. In Iranian adolescents, greater family cohesion has been associated with a reduced tendency toward risky behavior (Arabnejad et al., 2018). Similarly, family communication patterns have been linked to adolescents' risky behaviors, with emotional security identified as an important explanatory mechanism (Sarvari et al., 2023). Research assessing individual, family, and peer determinants of risky behavior among upper secondary school students has likewise demonstrated the importance of family-related factors in understanding

adolescent risk-taking (Abedi Parija & Sadeghi, 2022). In addition, findings obtained during the COVID-19 pandemic indicated that family support was meaningfully related to adolescents' emotional health and risk behavior, illustrating the capacity of supportive family relationships to buffer adolescents against stress and maladaptive behavioral responses (Shapiro et al., 2022).

Family functioning can protect against risk-taking through several mechanisms. Cohesive families provide adolescents with emotional connection, belonging, communication, and opportunities to seek assistance when confronted with distress or peer pressure. Adaptable families are also better able to modify rules, roles, expectations, and patterns of communication in response to adolescents' increasing needs for autonomy. These characteristics may reduce the likelihood that adolescents cope with distress through impulsive or risky behavior. Research on family cohesion and adaptability has shown that healthy family functioning is associated with balanced relational and temporal patterns within families with adolescents (Oyanadel et al., 2023). More broadly, ecological models of development conceptualize adolescents as embedded within interconnected systems in which proximal family relationships exert substantial influence over psychological and behavioral development (Gelmez Burakgazi, 2024). Accordingly, the present results suggest that family relational quality should not be regarded merely as a background variable but as an active developmental resource capable of reducing vulnerability to adolescent risk-taking.

An additional noteworthy result was the significant negative association between the quality of family relationships and computer game addiction. Family functioning was negatively correlated with gaming addiction ($r = -.381$), and regression analysis showed that better family relationship quality significantly predicted lower gaming addiction. This result aligns closely with recent evidence concerning familial determinants of problematic gaming. Systematic reviews have identified family functioning, parenting behavior, parent-child relationships, and family climate as important protective or risk factors for Internet Gaming Disorder among adolescents (Ergin & Essau, 2025; Petrescu et al., 2025). Longitudinal research has also demonstrated associations between parenting practices and problematic gaming, indicating that parental behaviors can have enduring relationships with adolescents' digital habits (Pivetta et al., 2024). Similarly, adolescent gaming has been longitudinally associated with parent-child emotional closeness, highlighting the relevance of relational

quality to gaming behavior (Boson et al., 2024). Earlier work has also emphasized that problematic media use develops within family processes rather than independently of them (Coyne & Stockdale, 2018).

The inverse relationship between family functioning and problematic gaming may also be reciprocal. Adolescents experiencing emotional distance, family conflict, inconsistent supervision, or inadequate communication may turn to digital gaming as a means of distraction, emotional regulation, achievement, or social compensation. At the same time, persistent excessive gaming can reduce opportunities for family interaction and generate conflict regarding time use, responsibilities, sleep, academic activities, or parental restrictions. Longitudinal evidence supports such reciprocal dynamics, showing a potentially vicious cycle between family dysfunction and problematic gaming over time (Zhou et al., 2023). Iranian research has similarly identified parenting style and cognitive characteristics as predictors of online gaming addiction among students (Zandi & Mirzaei Doustan, 2019). These findings indicate that family difficulties may facilitate problematic gaming while excessive gaming may, in turn, intensify relational difficulties, thereby creating a mutually reinforcing developmental process.

5. Conclusion

Taken together, the results support an integrated interpretation of adolescent high-risk behavior in which individual, behavioral, and family variables interact. Poor impulse control may increase sensitivity to immediate rewards and decrease consideration of future consequences; problematic gaming may provide a highly reinforcing behavioral context in which these tendencies are repeatedly expressed; and poor family functioning may reduce the emotional support, monitoring, communication, and behavioral structure that might otherwise constrain maladaptive behavior. Conversely, cohesive and adaptable family relationships may function as protective resources even when adolescents exhibit individual vulnerabilities. Research showing that familial risk can modify the consequences of inhibitory characteristics for adolescent psychological outcomes provides additional support for the importance of examining individual traits within their family context (Stevens et al., 2023). Therefore, the finding that the study variables explained a meaningful proportion of variance in high-risk behavior is consistent with a multidimensional developmental perspective rather than a

single-factor explanation. The results underscore that effective understanding and prevention of adolescent risk-taking require simultaneous attention to self-regulation, patterns of digital engagement, and the relational quality of the family environment.

The present study has several limitations that should be considered when interpreting its findings. First, the correlational and cross-sectional design does not permit causal conclusions regarding whether impulsivity, problematic gaming, or family relationship quality precede changes in high-risk behavior. Second, the study relied on self-report questionnaires, which may be affected by social desirability, inaccurate recall, or adolescents' reluctance to disclose sensitive behaviors. Third, participants were selected from upper secondary schools in District 1 of Shiraz, which limits the generalizability of the findings to adolescents in other geographical regions, educational settings, socioeconomic groups, or age ranges. The use of purposive sampling may also have introduced selection bias. In addition, potentially relevant variables such as peer influence, socioeconomic status, parental monitoring, academic stress, psychopathological symptoms, gaming genre, daily gaming duration, and reasons for gaming were not directly assessed. Finally, the sensitive nature of several components of high-risk behavior may have resulted in underreporting despite assurances of confidentiality.

Future studies should employ longitudinal designs to clarify the temporal and potentially reciprocal relationships among impulsivity, problematic gaming, family functioning, and adolescent high-risk behaviors. Larger samples drawn through probability-based sampling from different schools, regions, and cultural contexts would improve the external validity of the findings. Future research could also use multi-informant assessments involving adolescents, parents, and teachers and combine questionnaire data with behavioral measures of inhibitory control or objective indicators of gaming duration. Structural equation modeling could be used to examine whether impulsivity mediates the relationship between problematic gaming and high-risk behavior or whether family functioning moderates these associations. Researchers should also investigate individual dimensions of family cohesion and adaptability, distinct forms of high-risk behavior, gaming motives, game genres, peer influences, emotion regulation, and reward sensitivity. Intervention and experimental studies would be particularly valuable for determining whether improvements in impulse control or family relationships lead to measurable reductions in problematic gaming and high-risk behaviors over time.

The findings suggest that prevention programs for upper secondary school students should address adolescent high-risk behavior through coordinated individual- and family-level strategies rather than focusing on a single behavior in isolation. Schools can incorporate training in impulse control, delayed gratification, emotional regulation, decision-making, problem solving, and evaluation of behavioral consequences into counseling and life-skills programs. Screening procedures may help identify students showing simultaneous elevations in problematic gaming, impulsivity, and high-risk behavior so that support can be provided before difficulties become more severe. Parents can be assisted in establishing clear but developmentally appropriate rules regarding gaming, maintaining consistent supervision, and creating opportunities for supportive communication without relying exclusively on punitive restriction. Family-oriented interventions should emphasize emotional closeness, constructive conflict resolution, flexible but consistent boundaries, and active parental involvement in adolescents' lives. Cooperation among school counselors, psychologists, teachers, and families may ultimately provide the most effective framework for strengthening self-control, promoting healthy digital-media use, improving the family emotional climate, and reducing adolescents' engagement in high-risk behaviors.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Declaration of Interest

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

References

- Abedi Parija, H., & Sadeghi, E. (2022). Analyzing the Tendency toward Risky Behaviors among Upper-Secondary Students: Assessing Gender Differences Based on Individual, Family, and Peer Factors. *Research in Guidance and Counseling Education*(17), 34-57.
- Alizadeh, L., Momeni, K., & Jebraeili, H. (2023). The Relationship of Brain-Behavioral Systems, Impulsivity, and Delay Discounting with Risky Behaviors in Adolescents: The Mediating Role of Emotion Regulation Difficulties. *Quarterly Journal of Educational Psychology*, 19(68), 26-45.
- Arabnejad, S., Mofakhari, A., & Ranjbar, M. J. (2018). The Role of Family Cohesion and Self-Worth in Predicting the Tendency toward Risky Behaviors in Lower-Secondary Students. *Psychological studies*, 14(1), 147-162.
- Beauchaine, T. P., Zisner, A. R., & Sauder, C. L. (2017). Trait Impulsivity and the Externalizing Spectrum. *Annual Review of Clinical Psychology*, 13, 343-368. <https://doi.org/10.1146/annurev-clinpsy-021815-093447>
- Boson, K., Gurdal, S., Claesdotter-Knutsson, E., & Kapetanovic, S. (2024). Adolescent Gaming and Parent-Child Emotional Closeness: Bivariate Relationships in a Longitudinal Perspective. *Current Psychology*, 43. <https://doi.org/10.1007/s12144-024-05714-1>
- Brand, M., Young, K. S., Laier, C., Wölfling, K., & Potenza, M. N. (2016). Integrating Psychological and Neurobiological Considerations Regarding the Development and Maintenance of Specific Internet-Use Disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) Model. *Neuroscience & Biobehavioral Reviews*, 71, 252-266. <https://doi.org/10.1016/j.neubiorev.2016.08.033>
- Chen, S., Liao, J., Wang, X., Li, J., Liu, Y., & Zhang, W. (2025). Longitudinal Relationship between Gaming Disorder Symptoms, Hyperactivity/Inattention Symptoms and Aggression among Chinese Adolescents: Within-Person and Between-Person Effects. *Computers in human Behavior*, 167, 108608. <https://doi.org/10.1016/j.chb.2025.108608>
- Coyne, S. M., & Stockdale, L. A. (2018). Family Processes and Problematic Media Use among Adolescents.
- Ergin, D. A., & Essau, C. A. (2025). Family Factors and Internet Gaming Disorder among Adolescents: A Systematic Review. *International Journal of Developmental Science*, 19(3-4), 122-135. <https://doi.org/10.1177/2192001X251352496>
- Fong, T. C., Cui, K., & Yip, P. S. (2024). Interaction Effects Between Low Self-Control and Meaning in Life on Internet Gaming Disorder Symptoms and Functioning in Chinese Adolescents. *Journal of medical Internet research*, 26, e59490. <https://doi.org/10.2196/59490>
- Gelmez Burakgazi, S. (2024). The Ecological Model of Human Development. In. <https://doi.org/10.4018/979-8-3693-5812-2.ch013>

- Ghiaccio, R., Passaro, A., Stasolla, F., Martini, E., De Fortuna, A. M., & De Luca Picione, R. (2025). Exploring the Association Between Problematic Internet Use, Internet Gaming Disorder in Adolescents with ADHD: A Scoping Review. *International journal of environmental research and public health*, 22(4), 496. <https://doi.org/10.3390/ijerph22040496>
- Gou, S., Yuan, R., Zhang, W., Tang, Y., & Zhang, W. (2024). Problematic Social Media Use in Youths Causes Response Inhibition Impairment. *Current Psychology*, 43, 13555-13564. <https://doi.org/10.1007/s12144-023-05425-z>
- Habibzadeh, Z., & Ghorban Shiroudi, S. (2022). The Relationship between Online Gaming Dependence and Social Anxiety in Adolescents. *Quarterly Journal of New Ideas in Psychology*, 15(19).
- Hammad, M. A., & Al-Shahrani, H. F. (2024). Impulsivity and Aggression as Risk Factors for Internet Gaming Disorder among University Students. *Scientific reports*, 14(1), 3712. <https://doi.org/10.1038/s41598-024-53807-5>
- Han, T. S., Cho, H., Sung, D., & Park, M. (2022). A Systematic Review of the Impact of COVID-19 on the Game Addiction of Children and Adolescents. *Frontiers in Psychiatry*, 13, 976601. <https://doi.org/10.3389/fpsy.2022.976601>
- Jalali, H. (2023). *Examining the Effect of Computer Games on Students' Behavior and Academic Performance* Second National Conference on New Developments in Developmental and Educational Psychology, Bandar Abbas, Iran.
- Joukar, M., Masoumi, A., Joukar, M., Haghanejad, H., Akbari, A., & Ardian, N. (2023). Examining the Effect of Computer Game Use and the Presence of Aggression in Adolescents. *Toloo-e Behdasht*, 22(3), 50-60.
- Kaptanovic, A. (2024). Impulsivity as a Predictor of Risk Behaviors and Problematic Media Use among Adolescents. *Journal of youth and adolescence*.
- 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. <https://doi.org/10.1556/JBA.1.2012.1.1>
- Liu, Z., & Xie, J. (2025). The Development and Validation of the Adolescent Problematic Gaming Scale (PGS-Adolescent). *Behavioral Sciences*, 15(1), 13. <https://doi.org/10.3390/bs15010013>
- Mina, F., & Aminimanesh, S. (2021). Predictors of the Tendency toward Risky Behaviors in Adolescent Girls: The Role of Emotional Dysregulation, Differentiation, and Assertiveness. *Social Psychology Research*, 11(44), 183-197.
- Oyanadel, C., Worrell, F. C., Pinto-Vigueras, J., Betancur, S., Véliz Tapia, T., Au-Castro, M., Peña-Reyes, G., González-Loyola, M., & Peñate, W. (2023). Time Balance and Family Functioning: The Role of Time Perspective in the Cohesion and Adaptability of Families with Adolescents. *European Journal of Investigation in Health, Psychology and Education*, 14(1), 117-132. <https://doi.org/10.3390/ejihpe14010008>
- Petrescu, T., Błachnio, A., & Enea, V. (2025). Internet Gaming Disorder in Children and Adolescents: A Systematic Review of Familial Protective and Risk Factors. *Addictive behaviors*, 167, 108345. <https://doi.org/10.1016/j.addbeh.2025.108345>
- Pivetta, E., Marengo, D., & Settanni, M. (2024). Longitudinal Associations between Parenting Practices, Problematic Gaming, and Cyberaggression in Adolescence. *Computers in human Behavior*, 150, 107985. <https://doi.org/10.1016/j.chb.2023.107985>
- Pruitt, P. J. (2023). Neurobiological Sensitivity to Social Rewards and Punishments Moderates Link between Peer Norms and Adolescent Risk Taking. *Journal of Research on Adolescence*.
- Rani, K., Khakha, D. C., Karthikeyan, A. K. T., & Patra, B. N. (2025). Association between Gaming Disorders and Psychosocial Correlates among Adolescents. *Industrial Psychiatry Journal*, 34(3), 450-455. https://doi.org/10.4103/ipj.ipj_68_25
- Raybould, J. N., & Tunney, R. J. (2024). Factor Analysis of Impulsivity in Gaming Disorder and Internet Gaming Disorder. *BMC psychiatry*, 24, 652. <https://doi.org/10.1186/s12888-024-06072-9>
- Sarvari, M., Bayat, A., & Hosseinzadeh, A. (2023). The Relationship between Risky Behaviors and Family Communication Patterns in Adolescents: The Mediating Role of Emotional Security. *Journal of Family Research*, 19(3), 533-550.
- Shapiro, O., Gannot, R. N., Green, G., Zigdon, A., Zwillling, M., Giladi, A., & Harel-Fisch, Y. (2022). Risk Behaviors, Family Support, and Emotional Health among Adolescents during the COVID-19 Pandemic in Israel. *International journal of environmental research and public health*, 19(7), 3850. <https://doi.org/10.3390/ijerph19073850>
- Stevens, E. S., Funkhouser, C. J., Auerbach, R. P., Talati, A., Gameroff, M. G., Posner, J. E., Weissman, M. M., & Shankman, S. A. (2023). Inhibition Predicts the Course of Depression and Anxiety Symptoms among Adolescents: The Moderating Role of Familial Risk. *Journal of Nervous and Mental Disease*, 211(2), 100-107. <https://doi.org/10.1097/NMD.0000000000001584>
- Wang, Y., Li, Y., Liu, B., Zhao, X., Geng, X., Zhu, W., & Ding, X. (2024). Adolescent Internet Gaming Disorder and Sensitivity to Money and Social Rewards. *Acta Psychologica*, 248, 104431. <https://doi.org/10.1016/j.actpsy.2024.104431>
- Weinstein, A., & Lejoyeux, M. (2015). New Developments on the Neurobiological and Pharmacogenetic Mechanisms Underlying Internet and Videogame Addiction. <https://doi.org/10.1111/ajad.12110>
- Zandi, P. A., & Mirzaei Doustan, Z. (2019). Predicting Online Gaming Addiction Based on Cognitive Distortion, Parenting Style, and Narcissistic Personality Traits in Students. *Iranian Journal of Psychiatry and Clinical Psychology*, 25(1), 72-83.
- Zhou, J., Zhao, H., Wang, L., & Zhu, D. (2023). The Vicious Cycle of Family Dysfunction and Problematic Gaming and the Mediating Role of Self-Concept Clarity among Early Adolescents: A Within-Person Analysis Using Random Intercept Cross-Lagged Panel Modeling. *Journal of Behavioral Addictions*, 12(4), 920-937. <https://doi.org/10.1556/2006.2023.00054>