



The Associations of Family Cohesion and Impulsivity with High-Risk Behaviors in Female High School Students: The Mediating Role of Internet Addiction

Seyedeh Fatemeh Mousavian^{1*}, Reza Johari Fard^{1*}, Rezvan Homaei¹, Saeed Bakhtiarpour¹

¹Department of Psychology, Ahv.C., Islamic Azad University, Ahvaz, Iran

Abstract:

Introduction: Risky behaviors among adolescents represent a significant global public health concern. This study examined the direct and indirect effects of family cohesion and impulsivity on risky behaviors in female high school students, focusing on the mediating role of internet addiction.

Methods: A cross-sectional correlational design with structural equation modeling (SEM) was employed. The sample consisted of 661 female high school students in Ahvaz, Iran (2024–2025 academic year), selected via multi-stage cluster sampling. Instruments included the Family Cohesion Scale (FCS), Barratt Impulsiveness Scale (BIS-11), Young's Internet Addiction Test (IAT), and the Iranian Adolescent Risk-Taking Scale (IARS). The mediation model was tested using path analysis.

Results: Family cohesion was significantly and negatively associated with risky behaviors ($\beta = -0.23$, $P < 0.001$), while impulsivity showed a significant positive association ($\beta = 0.20$, $P < 0.001$). Internet addiction partially mediated both relationships, with significant indirect effects for family cohesion ($\beta = -0.05$, 95% CI $(-0.08, -0.03)$, $P < 0.001$) and impulsivity ($\beta = 0.07$, 95% CI $(0.04, 0.10)$, $P < 0.001$).

Conclusion: Lower family cohesion and higher impulsivity were associated with greater internet addiction, which in turn was associated with elevated risky behaviors among female adolescents. These cross-sectional findings are consistent with a statistical mediation model in which internet addiction partially mediates the associations between family cohesion/impulsivity and risky behaviors. Prevention and intervention efforts may benefit from targeting family bonds, impulsivity, and internet addiction to mitigate risky behaviors in this population.

Keywords: Adolescent, Family cohesion, Impulsive behavior, Internet addiction disorder, Health risk behaviors

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*Correspondence to:

Reza Johari Fard, Department of Psychology, Ahv.C., Islamic Azad University, Ahvaz, Iran.

Postal code/P.O. Box: 68875 61349. Telephone number: +98-61-3334 8420

Fax Number: +98-61-33329200

Email: rjoharifard@iau.ac.ir

Introduction

Adolescence, spanning ages 10 to 19, is a critical and dynamic developmental window characterized by profound biological, psychological, and social transitions (1). This phase involves the formation of identity, increased autonomy seeking, and due to the maturation imbalance between the brain's emotion/reward centers and the prefrontal cortex

an elevated proclivity for risk-taking (2). High-Risk Behaviors (HRBs) encompass a spectrum of actions such as substance misuse, aggressive conduct, early sexual activity, and non-suicidal self-injury, all of which significantly compromise well-being and are leading causes of morbidity and mortality worldwide (3). Within this demographic, female adolescents, in particular, often navigate unique psychosocial stressors. These include intense pressure regarding body

image, the complexities of peer relationships, and adherence to shifting societal expectations, which can manifest in gender-specific patterns of maladjustment and risk-taking (4). For instance, some studies indicate that girls are more prone to internalizing HRBs like self-harm or eating disorders, while boys may lean toward externalizing behaviors like aggression (5). By focusing exclusively on female students, the present study aimed to examine these gender-specific patterns in greater depth while eliminating potential confounding effects of gender.

Family Cohesion, a cardinal dimension of healthy family functioning, refers to the emotional bonding members have with one another, encompassing the degree of closeness, support, and shared time and space (6). High cohesion acts as a crucial protective factor, providing a stable, warm, and secure environment where adolescents can effectively develop resilience, internalize essential social norms, and acquire necessary emotional regulation skills (7). According to Social Control Theory, strong emotional bonds to family inhibit deviant behavior by raising the perceived costs of nonconformity. The family unit, particularly when highly cohesive, serves as a primary source of emotional support and structured monitoring, which buffers the adolescent against external negative influences (8). Conversely, low family cohesion—often marked by emotional disengagement, diffuse boundaries, or chronic conflict has been consistently linked to various negative outcomes in youth, including increased feelings of isolation, poor academic achievement, and elevated externalizing problems (9). Research repeatedly demonstrates that strong, cohesive family ties are inversely correlated with engagement in HRBs, suggesting that the attachment, warmth, and effective communication inherent in these families create a protective shield against the temptation and pressures towards engaging in risky choices (10).

Impulsivity is a fundamental executive function defined as acting on immediate urges or desires without adequate consideration of potential negative consequences (11). It is considered a transdiagnostic construct associated with numerous psychological disorders and

nearly all forms of maladaptive behaviors. High impulsivity severely limits an adolescent's capacity for foresight, patience, and reflective, planned decision-making (12). Given that HRBs are, by definition, actions often initiated without careful consideration of future harm or consequences, it is unsurprising that high impulsivity stands out as a potent and robust predictor of such behaviors (13). Studies consistently show that individuals scoring high on trait impulsivity are statistically more likely to engage in substance abuse initiation, reckless driving, gambling, and aggressive behavior (14). Therefore, elevated impulsivity represents a core internal vulnerability factor that dramatically lowers the cognitive and emotional threshold for female students to engage in immediate gratifying, yet high-risk, actions (15).

Internet addiction, frequently termed Problematic Internet Use (PIU), is characterized by excessive and compulsive reliance on the internet, leading to distress, functional impairment across various life domains, and clear withdrawal symptoms upon forced cessation (16). Internet addiction has rapidly emerged as a significant public health concern in the digital age, particularly affecting adolescents who use the virtual world as a primary avenue for social interaction, entertainment, and, critically, emotional escape and stress coping (17). Conceptually, internet addiction is hypothesized to act as a crucial mediating mechanism between established risk factors (family and individual) and the ultimate engagement in HRBs (18). Adolescents experiencing low family cohesion or emotional neglect may turn to the virtual world as a compensatory mechanism to fulfill unmet needs for belonging and intimacy, consistent with Compensatory Internet Use Theory, while those with high impulsivity inherently struggle to self-moderate their screen time, leading to compulsive use (19). This compulsive digital engagement displaces healthier coping mechanisms, reduces participation in real-world supportive activities, and can expose the individual to online communities that normalize or even promote risky behaviors, effectively translating internal vulnerabilities into externalized actions (20).

While the individual links between family factors, impulsivity, and risky behaviors are well-

documented, research integrating these variables into a single structural equation model particularly one testing internet addiction as a mediator in female adolescents remains limited (21). Furthermore, contextual factors are paramount; cultural norms, family structures, and local educational environments in regions like Iran can significantly modulate the relationship between these constructs, necessitating localized studies to inform culturally sensitive interventions (22). Few studies have utilized robust structural equation modeling to simultaneously examine the direct and indirect pathways among family cohesion, impulsivity, internet addiction, and HRBs in a female-only sample. Addressing this empirical and theoretical gap is essential for developing comprehensive prevention programs that target the underlying psychological vulnerabilities and environmental stressors. Therefore, this study examined the predictive roles of family cohesion and impulsivity on risky behaviors and investigated the mediating effect of internet addiction among female high school students.

Methods

Study Design

This research employed a quantitative, cross-sectional, correlational design utilizing Structural Equation Modeling (SEM) to examine the hypothesized mediating relationships.

Participants

The statistical population for this study comprised all female high school students enrolled in the city of Ahvaz, Iran, during the 2024–2025 academic year (estimated $N \approx 45,000$ across public schools). A total of 700 students were invited to participate, of whom 678 met eligibility criteria and provided complete consent; 661 completed the questionnaires sufficiently for inclusion, yielding a response rate of 94.4% (661/700) and 97.5% among eligible participants. A target sample size of 661 students was determined to ensure adequate statistical power for the complex path analysis model. Sample size was calculated a priori using Monte Carlo simulation for SEM parameters (assuming medium effect sizes, power=0.80, $\alpha=0.05$), indicating that $n>500$ would provide sufficient power for models with approximately 10–15

estimated parameters. The final $n=661$ exceeded conventional guidelines of 10–20 cases per estimated parameter in the proposed model. Participants were selected using a multi-stage cluster sampling method. Initially, 4 out of 8 educational districts were randomly selected; within these districts, 20 schools were randomly chosen (5 per district), followed by random selection of 1–2 classrooms per school (total 35 classrooms). Proportional allocation was applied to ensure representation across grade levels. Intraclass correlations (ICC) for key variables were low (<0.05), and design effects were minimal (<1.3); thus, no adjustments for clustering were applied in the primary SEM analyses. Inclusion criteria mandated that participants be currently enrolled female high school students, possess full informed consent from a parent or legal guardian, and voluntarily agree to participate. Exclusion criteria included self-reported history of a diagnosed clinical psychiatric disorder or failing to complete more than 10% of the questionnaire items. Self-reported psychiatric history was assessed via a single screening item (“Have you ever been diagnosed with a mental health disorder by a psychiatrist or psychologist?”); this reliance on self-report is acknowledged as a potential limitation. All procedures adhered to the ethical guidelines of the institutional review board. Before commencing data collection, written informed consent was obtained from the school authorities, parents, and the adolescents themselves, ensuring their participation was strictly voluntary and confidential.

Measures

The Iranian Adolescent Risk-Taking Scale (IARS): The IARS was employed to quantify the level of engagement in HRBs among the participants. This instrument, developed specifically for Iranian adolescents, consists of 38 items scored on a 5-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The scale comprehensively evaluates risk propensity across seven distinct areas, including substance use, aggressive behaviors, and driving risk. The minimum attainable score is 38, and the maximum is 190, where higher cumulative scores denote a greater tendency toward risk-taking (23). The scale has demonstrated strong

psychometric properties in previous validation studies within Iran, reporting an excellent internal consistency of $\alpha=0.94$ (23). In the current study with the female student sample, the IARS maintained robust reliability, yielding a Cronbach's alpha coefficient of 0.89.

The Family Cohesion Scale (FCS): Family cohesion was assessed using the 16-item Family Cohesion Scale (FCS), an instrument established based on foundational family models, such as Olson's Circumplex Model. Participants rated their family dynamics on a 5-point Likert format, where 1 signified complete disagreement and 5 indicated complete agreement. Total scores on this measure range from 16 to 80. Elevated scores reflect a greater degree of emotional closeness, interdependence, and support within the family unit. Studies of Persian-speaking populations have consistently supported its reliability, with reported alpha coefficients around 0.79 (24). For the present sample, the FCS exhibited appropriate internal consistency, achieving a Cronbach's alpha coefficient of 0.81.

Barratt Impulsiveness Scale (BIS-11): Impulsivity was measured by the widely utilized Barratt Impulsiveness Scale (BIS-11). This 30-item self-report tool scores responses on a 4-point Likert scale (ranging from 1=Rarely/Never to 4=Always/Almost Always). The instrument is designed to capture three underlying facets of impulsivity: motor, non-planning, and attentional impulsiveness. The total score can vary from 30 to 120, with an increased score directly corresponding to a higher overall level of trait impulsivity (and thus lower impulse control) (25). The Persian version of the BIS-11 has been repeatedly validated in Iran, with previous reliability estimates near 0.81 (26). Its strong psychometric standing was confirmed in this research, where the total scale yielded a high internal reliability of 0.87.

Internet Addiction Test (IAT): The severity of internet addiction was quantified using Young's internationally recognized Internet Addiction Test (IAT). This tool consists of 20 questions, rated on a five-point Likert scale anchored by 1 (rarely) and 5 (always). The score, generated by summing all item responses, provides a continuum that ranges from a minimum of 20 to a maximum of 100. A higher score serves as an

indicator of greater dependency on the internet, signifying more severe problematic use (27). Previous Persian validation studies have demonstrated excellent internal consistency, with alpha coefficients of 0.92 (28). In this specific cohort of female adolescents, the IAT showed outstanding reliability, calculated as a Cronbach's alpha coefficient of 0.93.

Procedure

Data collection was carried out in quiet classroom settings during the academic day to maximize privacy and concentration. Trained research assistants administered the questionnaire packets, which included the informed consent form and the four psychometric instruments. To minimize response fatigue given the total of 104 items, questionnaires were presented in a fixed balanced order (FCS → BIS-11 → IAT → IARS) across all sessions, with scheduled short breaks provided after every two instruments. Participants were monitored for signs of fatigue, and responses were reviewed on-site for completeness. Standardized instructions were provided to all participants, and they were explicitly assured of the anonymity and confidentiality of their responses. Participants were given approximately 45 minutes to complete the self-report measures. The researchers remained present to answer any procedural questions, ensuring that the integrity and consistency of the data collection process were maintained across all sampled groups.

Data Analysis

Data analysis was performed using SPSS (version 27) and AMOS (version 25). Descriptive statistics (means, standard deviations) and Pearson correlations were calculated, followed by Structural Equation Modeling (SEM) using path analysis based on observed total scores (rather than latent constructs) to test the direct effects and the hypothesized mediating effect of Internet Addiction. Missing data were minimal (<3% across variables) and handled using full information maximum likelihood (FIML) estimation in AMOS. The bootstrapping method (5,000 samples) was employed to rigorously assess the significance of the indirect effects. Age, grade level, and academic major were considered as potential covariates; preliminary

analyses showed negligible associations with the primary paths ($r < |0.10|$), and their inclusion did not alter substantive conclusions. Socioeconomic status (SES) was not formally assessed due to logistical constraints in the school setting. Thus, these variables were not included in the final model to preserve parsimony.

Results

A total of 661 female high school students from Ahvaz, Iran, participated in the study. Participants were aged 15–18 years, with a mean age of 16.32 years ($SD=1.03$). Regarding grade level, 24.4% ($n=161$) were in 10th grade, 38.7% ($n=256$) in 11th grade, and 36.9% ($n=244$) in 12th grade. Academic majors were distributed as follows: humanities (23.4%), empirical sciences (36.8%), mathematics/physics (28.9%), and other fields (10.9%).

Table 1 presents the means, standard deviations, skewness, kurtosis, and Pearson correlation coefficients for the main variables. Mean scores were 56.45 ($SD=13.57$) for family cohesion, 68.41 ($SD=12.84$) for impulsivity, 50.82 ($SD=18.21$) for internet addiction, and 88.46 ($SD=22.12$) for risky behaviors. Skewness and kurtosis values fell within the acceptable range (-2 to $+2$), indicating approximate univariate normality. Family cohesion was negatively correlated with both internet addiction ($r=-0.52$, $P<0.01$) and risky behaviors ($r=-0.46$, $P<0.01$). Impulsivity and internet addiction showed positive correlations with risky behaviors ($r=0.37$ and $r=0.57$, respectively, $p<0.01$), supporting the preliminary conditions for the proposed mediation model.

Table 1. Descriptive statistics, normality indices, and bivariate correlations among study variables

Variables	Mean	SD	Skewness	Kurtosis	1	2	3	4
1- Family cohesion	56.45	13.57	-0.13	-0.58	-			
2- Impulsivity	68.41	12.84	0.29	-0.18	-0.48**	-		
3- Internet addiction	50.82	18.21	0.06	-1.09	-0.52**	0.39**	-	
4- Risky behaviors	88.46	22.12	0.92	-0.23	-0.46**	0.37**	0.57**	-

** $P<0.01$

The hypothesized model was tested using path analysis with observed total scale scores. Preliminary checks indicated no extreme outliers and acceptable multivariate normality. Table 2 displays the fit indices of the final structural model. The chi-square value was statistically significant ($\chi^2=276.80$, $p<0.001$); however, the normed chi-square ($\chi^2/df=2.77$) remained below the conservative threshold of 3.0. Additional

indices indicated good to excellent model fit: GFI=0.95, AGFI=0.92, CFI=0.97, TLI=0.96, SRMR=0.048, and RMSEA=0.052 (95% CI (0.045, 0.059)). All fit indices met or exceeded conventional criteria ($\chi^2/df<3$, GFI/CFI>0.95, AGFI>0.85, RMSEA<0.08), confirming that the hypothesized model adequately represented the observed data.

Table 2. Goodness-of-fit indices for the hypothesized structural model

Fit indicators	χ^2	df	(χ^2/df)	GFI	AGFI	CFI	TLI	SRMR	RMSEA (95% CI)
Model	276.80	100	2.77	0.95	0.92	0.97	0.96	0.048	0.052 (0.045–0.059)
Acceptable range	-	-	1 to 3	>0.95	>0.85	>0.95	>0.95	<0.08	<0.08

Table 3 summarizes the standardized path coefficients and indirect effects. Family cohesion negatively predicted internet addiction ($\beta=-0.17$, $P<0.001$) and risky behaviors ($\beta=-0.23$, $P<0.001$). Impulsivity positively predicted both internet addiction ($\beta=0.24$, $P<0.001$) and risky behaviors ($\beta=0.20$, $P<0.001$). Internet addiction significantly predicted risky behaviors ($\beta=0.30$, $P<0.001$). The indirect effect of family cohesion on risky behaviors via internet addiction was significant ($\beta=-0.05$, 95% CI $(-0.08, -0.03)$,

$P<0.001$), as was the indirect effect of impulsivity ($\beta=0.07$, 95% CI $(0.04, 0.10)$, $P<0.001$), confirming partial mediation. The model explained 42% of the variance in internet addiction ($R^2=0.42$) and 53% of the variance in risky behaviors ($R^2=0.53$). Total effects were $\beta=-0.28$ for family cohesion and $\beta=0.27$ for impulsivity on risky behaviors (both $P<0.001$). Figure 1 illustrates the final structural model with standardized coefficients.

Table 3. Direct and indirect effects in the final structural model (Bootstrapping=5,000 samples)

Paths	B	SE	β	95% CI for β	P
Family cohesion → Internet addiction	-0.27	0.06	-0.17	$(-0.23, -0.11)$	0.001
Impulsivity → Internet addiction	1.29	0.25	0.24	$(0.17, 0.31)$	0.001
Internet addiction → Risky behaviors	0.05	0.01	0.30	$(0.24, 0.36)$	0.001
Family cohesion → Risky behaviors	-0.06	0.01	-0.23	$(-0.30, -0.16)$	0.001
Impulsivity → Risky behaviors	0.17	0.04	0.20	$(0.13, 0.27)$	0.001
Family cohesion → Risky behaviors through Internet addiction	-0.01	0.01	-0.05	$(-0.08, -0.03)$	0.001
Impulsivity → Risky behaviors through Internet addiction	0.06	0.01	0.07	$(0.04, 0.10)$	0.001

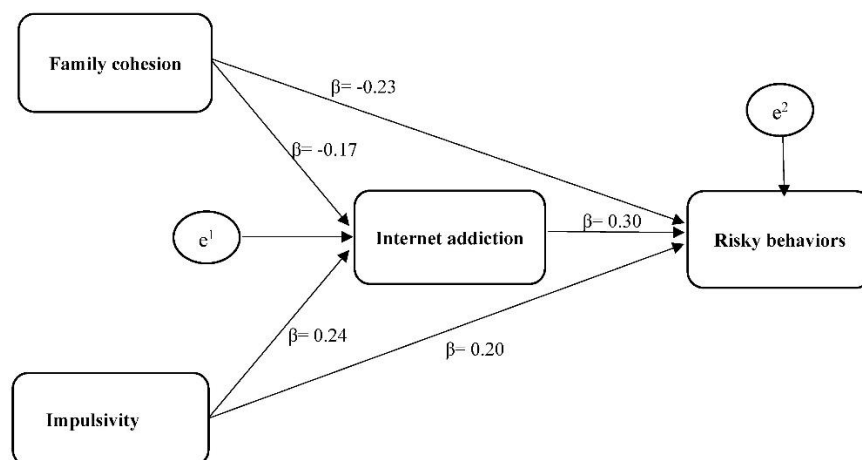


Figure 1. Final structural model with standardized path coefficients

Discussion

The current study utilized SEM to test a comprehensive model hypothesizing that internet addiction mediates the relationship between both family cohesion and impulsivity, and HRBs among female high school students. The results confirmed the model's robustness, demonstrating that weak family bonds and high impulsivity were significantly associated with HRBs, partially through the mechanism of problematic

Internet use. The following paragraphs delve into the interpretation and theoretical significance of these findings.

The analysis revealed a statistically significant negative direct association between family cohesion and engagement in HRBs, indicating that a stronger sense of family togetherness and support acts as a formidable protective barrier. This moderate effect size suggests that higher family

cohesion is associated with substantively lower risky behaviors, highlighting its practical importance as a key target for preventive interventions. A cohesive family unit provides a stable, warm, and secure attachment base, which fosters the development of adaptive coping strategies and a strong internal locus of control in adolescents (29). When female students feel emotionally supported and monitored, their need to seek external validation or escape through deviant or risky activities diminishes. This finding strongly aligns with the tenets of Social Control Theory, which posits that strong emotional attachments to conventional institutions, particularly the family, inhibit non-conformist behavior by increasing the personal cost of engaging in deviance (30). For instance, a study by Padilla-Walker et al. (31) in a multi-ethnic adolescent population similarly found that high parental monitoring and family warmth significantly predicted lower rates of substance use and delinquency.

The results confirmed a strong positive direct relationship between impulsivity (a deficit in impulse control) and engagement in HRBs. This small-to-moderate effect underscores the role of impulsivity as an important individual vulnerability factor, with implications for screening and targeted skill-building interventions to enhance self-regulation. This outcome underscores the pivotal role of self-regulation deficits as a fundamental internal vulnerability factor driving HRBs (4). High-risk actions, by their very nature, are often characterized by spontaneous initiation and a failure to consider delayed negative consequences. Adolescents with higher impulsivity are therefore biologically and psychologically predisposed to make rash, ill-advised decisions, whether it is participating in aggressive acts or engaging in unprotected activities (13). This finding is robustly supported by global literature. The seminal longitudinal work by Miklósi and Kovács (32) identified impulsivity as a core trans-diagnostic trait underlying various externalizing disorders and pervasive risky decision-making across the lifespan. Locally, research by Barati et al. (33) among students in Tehran similarly established impulsiveness as one of the strongest predictors for the onset and persistence of behaviors such as reckless

driving and addiction susceptibility. Consequently, deficits in executive function represent a critical intervention target for mitigating immediate and long-term risks in this population.

A significant theoretical contribution of this study is the confirmation of the indirect path: family cohesion to internet addiction to risky behaviors. Although this indirect effect is small in magnitude, it supports the notion that problematic internet use partially accounts for the association between low family cohesion and elevated HRBs, suggesting value in family-based programs that also address digital habits. This mediation suggests that low family cohesion acts as a distal risk factor that first is associated with greater internet addiction, which then serves as a proximal factor linked to HRBs. When the family environment fails to provide sufficient emotional intimacy or effective supervision, female adolescents may turn to the virtual world as a maladaptive strategy for emotional escape, fulfillment of belonging needs, or stress coping (34). This finding aligns with the Compensatory Internet Use Theory, which argues that individuals use the internet to compensate for psychosocial deficits in their real lives (35). Qi (36) emphasized that familial discord and poor parental communication significantly predicted greater time spent in immersive online environments, ultimately leading to negative offline consequences and risky exposure. Similarly, a study by Harsej et al. (37) noted that weak family functionality was a critical antecedent for internet addiction among Iranian youth, highlighting the importance of family stability in a digital context.

The model further established a significant indirect pathway from impulsivity to internet addiction to risky behaviors. This small-to-moderate indirect effect indicates that internet addiction partially explains how higher impulsivity relates to increased HRBs, pointing to the potential benefits of interventions that simultaneously target self-regulation and online behavior management. This finding underscores the fact that poor self-control is associated with uncontrolled digital engagement. Individuals high in impulsivity inherently struggle with the self-regulation required to limit screen time,

making them highly susceptible to the compulsive and immediately rewarding nature of internet addiction (38). This problematic digital involvement displaces time that could be spent on healthier activities, disrupts sleep and academic performance, and, crucially, exposes the adolescent to online peer groups or content that normalize, encourage, or facilitate various forms of risky behavior (11).

Despite the rigorous methodological approach, this study is constrained by its cross-sectional design, which precludes definitive causal inferences and only allows for the examination of associations at a single point in time. Additionally, the exclusive reliance on self-report measures carries the

risk of social desirability bias. Furthermore, potential confounders such as age, grade level, academic major, and socioeconomic status were not controlled in the final model, which may influence the observed associations. Furthermore, the generalizability of the findings is limited to female high school students in a specific urban context in Iran, necessitating caution when applying these results to other genders or distinct cultural settings. Future research should prioritize longitudinal designs to confirm the temporal direction of the observed pathways and incorporate multi-method data collection (e.g., parental reports) for a more comprehensive assessment.

Conclusion

This study, employing SEM, presented a comprehensive framework for explaining high-risk behaviors in female high school students and confirmed the hypothesized partial mediating role of internet addiction. The central findings demonstrate that strong family cohesion functions as a vital and direct protective factor, significantly associated with lower propensity for risky behaviors. Conversely, high impulsivity stands as a powerful individual vulnerability that positively predicts greater engagement in high-risk actions. Crucially, Internet Addiction acts as a key psychological mechanism through which both inadequate family bonds and elevated impulsivity indirectly are associated with higher high-risk behaviors (small to moderate effect sizes overall). These cross-sectional results underscore the necessity of developing multi-level prevention models that concurrently address environmental factors (family functioning) and individual factors (impulsivity). Consequently, educational and mental health policymakers may consider interventions aimed at strengthening family solidarity and enhancing self-regulatory skills to effectively mitigate the risk of Internet dependency and subsequent high-risk behaviors in female adolescents.

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Data Availability

This research data is available and could be sent upon contact with the corresponding author.

Ethics Approval

This study received approval from the Research Ethics Committee of Islamic Azad University, Ahvaz Branch, Iran (Ethics Code: IR.IAU.AHVAZ.REC.1404.354).

Conflict of Interest

There are no conflicts of interest regarding the publication of the current research.

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