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A Predictive Model of High-Risk Sexual Behaviors in Female High School Students Based on Cognitive Emotion Regulation Styles with the Mediating Role of Hardiness

Mahbobeh. Alizadeh Godarzi[1], Alireza. Pirkhaefi[2*], Sara. Haghighat[3]

[1] PhD Student, Educational Psychology Department, Ga. C, Islamic Azad University, Garmsar, Iran
[2] Department of Clinical Psychology, Ga.C., Islamic Azad University, Garmsar, Iran
[3] Department of General Psychology, Ga.C., Islamic Azad University, Garmsar, Iran

*** Corresponding author email address**: apirkhaefi@iau.ac.ir

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A B S T R A C T

Purpose: This study aimed to develop and test a predictive model of high-risk sexual behaviors among female high school students based on cognitive emotion regulation strategies, with psychological hardiness as a mediating variable.

Methods and Materials: The study employed an applied, descriptive-correlational design using structural equation modeling. The sample included 300 female students from second-cycle high schools in Babol city during the 2022–2023 academic year, selected via non-random, voluntary sampling. Data were collected using standardized questionnaires: the Sexual Risk Behaviors Questionnaire, the Cognitive Emotion Regulation Questionnaire (CERQ), and the Hardiness Profile. Validity and reliability of the instruments were confirmed. Data analysis involved SPSS v25 and SmartPLS software for path analysis and hypothesis testing.

Findings: Results indicated that negative cognitive emotion regulation strategies positively predicted engagement in high-risk sexual behaviors (β = 0.736) and negatively predicted psychological hardiness (β = –0.742). Conversely, positive regulation strategies were associated with decreased risky sexual behaviors (β = –0.738) and increased hardiness (β = 0.744). Psychological hardiness negatively predicted risky sexual behaviors (β = –0.748) and mediated the relationships between both positive and negative regulation strategies and risky behaviors. All hypothesized paths were statistically significant at $p < 0.01$, with model fit indices supporting the structural model's adequacy.

Conclusion: The study confirms the significant direct and indirect roles of cognitive emotion regulation strategies in predicting high-risk sexual behaviors among female adolescents, with psychological hardiness serving as a key mediating protective factor. These findings highlight the importance of fostering adaptive emotion regulation and resilience in interventions aimed at reducing sexual risk-taking in adolescent girls.

Keywords: *High-risk sexual behaviors, cognitive emotion regulation styles, hardiness.*

1. Introduction

Adolescence is a critical developmental period characterized by significant biological, psychological, and social changes, during which individuals increasingly encounter complex challenges and engage in behaviors that may impact their current and future well-being. Among these challenges, the emergence of high-risk sexual behaviors stands out as a major public health concern due to its associations with sexually transmitted infections (STIs), unintended pregnancies, psychological distress, and long-term negative health outcomes (Nelson et al., 2024; Rahman et al., 2024; Zarei et al., 2020). As global social norms evolve and access to information expands, the prevalence and determinants of risky sexual behaviors among adolescents have garnered increased scholarly attention, prompting researchers and practitioners to seek a deeper understanding of the underlying psychological, familial, and social factors influencing these behaviors (Chalooyi et al., 2023; Margaretha et al., 2023; Singh, 2024). The urgent need for effective preventive strategies makes it essential to identify the pathways through which adolescents become vulnerable to such behaviors and the protective mechanisms that might buffer these risks.

High-risk sexual behaviors among adolescents are often conceptualized within the framework of risk-taking and sensation-seeking tendencies, shaped by a combination of neurobiological, environmental, and psychosocial factors (Afzali Ziyarani et al., 2023; Mozaffari, 2022; Tatari et al., 2021). While a certain degree of risk-taking is normative and may even facilitate adaptive developmental outcomes, engagement in unprotected sex, multiple sexual partnerships, and substance use during sexual encounters can result in serious, and sometimes irreversible, consequences (Basiru et al., 2024; Cho & Yang, 2023; Hubach et al., 2021). In diverse cultural and geographical contexts, studies have identified that early sexual initiation and persistent engagement in risky sexual practices are often accompanied by poor emotional regulation, lack of psychological resilience, and the absence of supportive family structures (Ahadi et al., 2021; Chalooyi et al., 2023; Nelson et al., 2024). These findings suggest the necessity of integrating individual psychological processes and environmental influences to comprehensively address adolescent sexual health.

Emotion regulation—the capacity to monitor, evaluate, and modulate emotional responses—has emerged as a critical psychological construct in understanding a wide range of adolescent behaviors, including those that pose risks to health and social adaptation (Kozubal et al., 2023; Mitchell et al., 2023; Singh et al., 2024). Adolescents who struggle to regulate their emotions effectively are more likely to engage in impulsive and risky behaviors as maladaptive coping strategies for negative affect or social stressors (Margaretha et al., 2023; Mirzaei Fayyaz Abadi et al., 2019; Singh et al., 2024). Recent empirical evidence indicates that specific cognitive emotion regulation strategies, such as rumination, catastrophizing, and self-blame, are positively correlated with risky sexual behaviors, while adaptive strategies like positive reappraisal, acceptance, and putting problems into perspective serve as protective factors (Margaretha et al., 2023; Mitchell et al., 2023; Sefidrood & Hobbi, 2023). These findings have been corroborated across various cultural samples, highlighting the universal significance of cognitive emotion regulation in predicting risk behavior in adolescence.

The role of family and parenting in shaping adolescents' emotion regulation abilities and their propensity for high-risk behaviors has also been well-documented (Afzali Ziyarani et al., 2023; Nelson et al., 2024). Parenting styles that foster autonomy, warmth, and open communication about sexual health have been shown to decrease the likelihood of risky sexual engagement, in part by enhancing self-efficacy and psychological resilience in youth (Mosley, 2023; Nelson et al., 2024). Conversely, environments marked by inconsistency, neglect, or punitive discipline can undermine emotional competence and promote maladaptive behavior patterns (Ahadi et al., 2021; Rahman et al., 2024). Attachment theory offers further insight, positing that secure attachment relationships with caregivers facilitate the development of adaptive emotion regulation, which in turn mitigates risk-taking tendencies (Willis, 2022; Zarei et al., 2019).

Resilience and psychological hardiness have been conceptualized as crucial protective factors that buffer the impact of stressors and promote adaptive functioning in the face of adversity (Bartone et al., 2022; Blann, 2023; Chuning et al., 2024). Hardiness—a multidimensional construct encompassing commitment, control, and challenge—has been linked to better mental health outcomes, lower susceptibility to burnout, and reduced engagement in maladaptive behaviors, including substance use and risky sexual activities (Alenezi et al., 2024; Graham et al., 2024; Kulak et al., 2021). Notably, adolescents high in hardiness demonstrate greater perseverance, problem-solving skills, and the ability to reframe challenges as opportunities for

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growth, thereby exhibiting resilience to environmental and psychological pressures (Bartone et al., 2022; Chuning et al., 2024). Studies have also suggested that psychological hardiness moderates the relationship between emotion regulation difficulties and risk behaviors, serving as a mediating or buffering variable in the risk pathway (Alenezi et al., 2024; Sefidrood & Hobbi, 2023).

Cultural and societal influences further complicate the landscape of adolescent sexual risk-taking. In societies undergoing rapid social change and increased access to technology, adolescents may be exposed to conflicting values and ambiguous messages regarding sexuality and relationships (Hubach et al., 2021; Singh, 2024). The intersection of digital media, peer pressure, and insufficient sex education can foster environments where misinformation and risky experimentation become more prevalent (Chalooyi et al., 2023; Singh, 2024). Importantly, gender plays a significant role, with female adolescents often facing unique pressures and vulnerabilities, especially in societies where open discussion of sexual health is stigmatized or taboo (Rahman et al., 2024; Zarei et al., 2020). Recent research has called for the development of gender-sensitive preventive interventions that empower young women with knowledge, assertiveness, and adaptive emotion regulation skills (Chalooyi et al., 2023; Margaretha et al., 2023; Mina & Amini Manesh, 2021).

In the Iranian context, the need to address adolescent high-risk sexual behaviors has been underscored by both rising incidence rates and the complexity of social, religious, and cultural determinants (Afzali Ziyarani et al., 2023; Mozaffari, 2022; Zarei et al., 2020). Several studies have documented the association between cognitive emotion regulation, executive functions, and the tendency toward risky behaviors among Iranian adolescents, reinforcing the importance of psychological constructs in the design of effective preventive programs (Dabir Ghorusi, 2022; Mirzaei Fayyaz Abadi et al., 2019; Mozaffari, 2022). Furthermore, evidence points to the role of gender norms, family communication patterns, and access to accurate health information in shaping risk trajectories (Afzali Ziyarani et al., 2023; Sefidrood & Hobbi, 2023; Zarei et al., 2020).

Despite advances in understanding the correlates of high-risk sexual behaviors, significant gaps remain regarding the mechanisms through which emotion regulation and hardiness interact to influence risk propensity among adolescent girls. Recent conceptual models have proposed that hardiness may mediate or moderate the impact of cognitive emotion regulation strategies on behavioral outcomes, but empirical support for these pathways remains limited and context-dependent (Alenezi et al., 2024; Blann, 2023; Chuning et al., 2024). In addition, most studies have focused on Western or urban populations, with less attention paid to the interplay of these psychological factors in non-Western, rapidly changing societies (Rahman et al., 2024; Singh, 2024).

The current study aims to address these gaps by investigating the predictive model of high-risk sexual behaviors among female high school students based on cognitive emotion regulation styles, with the mediating role of psychological hardiness.

2. Methods and Materials

2.1. Study Design and Participants

The present study is applied in nature and employs a descriptive-correlational research design using structural equation modeling. The statistical population consisted of all female students in the second cycle of high school in the city of Babol during the academic year 2022–2023, totaling 8,522 students according to the Education Department statistics. The sample size was determined based on the structural equation modeling (SEM) framework. In SEM research, sample size is calculated according to the number of paths and subscales. In the present study, based on the number of paths, measurement errors, and 14 subscales, a total of 26 parameters were identified, with a ratio of 10 participants per parameter, resulting in a sample size of 260. To ensure robustness, the final sample size was estimated at 300 participants. The sample was selected through non-random, voluntary sampling from Osveh, Azarm, Effaf, and Fahima schools, based on predefined inclusion criteria. The questionnaires were administered online. After designing the online forms, the researcher shared the questionnaire links via the Shad and Baleh social media platforms. To complete the online survey, answering all questions was mandatory to proceed, ensuring data completeness. Data collection continued until the required sample size was reached, and finally, responses from 300 participants were analyzed.

Inclusion criteria were being enrolled during the research period, providing informed consent, absence of diagnosed behavioral or emotional problems (as indicated in student counseling records), and being aged 16 to 18. Exclusion criteria included incomplete questionnaires and withdrawal from the study.

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2.2. Measures

Sexual Risk Behaviors Questionnaire: Developed by Zarei et al. in 2010 to assess high-risk sexual behaviors. This questionnaire includes 10 items across four subscales: condom non-use during intercourse, drug use during sexual activity, multiple sexual partners, and non-normative sexual practices (anal and oral sex). Items are scored using four- and five-point Likert formats. The first eight items are scored directly from 0 to 4, and the last two items inversely from 0 to 3. A higher total score indicates more high-risk sexual behavior. Cronbach's alpha in the original study was 0.86. In Zare et al.'s (2019) validation, exploratory factor analysis identified two factors, accounting for 71.73% of variance. Factor one included six items on substance-related risky sexual behavior, and factor two included four items on non-normative sexual behavior. Cronbach's alpha for the two factors and overall were 0.82, 0.86, and 0.91, respectively. In the current study, the reliability coefficient was 0.85.

Cognitive Emotion Regulation Questionnaire (CERQ): Developed by Garnefski and Kraaij (2006), this instrument assesses individuals' cognitive responses to threatening or stressful life events. It contains 36 items scored on a 5-point Likert scale (1 = never to 5 = always). The questionnaire includes nine distinct subscales, each with four items, reflecting different regulation strategies: self-blame, other-blame, rumination, and catastrophizing (negative styles); acceptance, positive refocusing, refocus on planning, positive reappraisal, and putting into perspective (positive styles). Cronbach's alpha for the positive, negative, and total scales were 0.91, 0.87, and 0.93, respectively. Total scores range from 36 to 180, with higher scores indicating greater use of a strategy. Convergent and divergent validity was assessed using correlations with the Beck Depression Inventory (BDI). Positive correlations with depression were found for self-blame (r = 0.20), catastrophizing (r = 0.29), and other-blame (r = 0.45); negative correlations were found for acceptance (r = –0.21), positive refocusing (r = –0.23), refocus on planning (r = –0.19), positive reappraisal (r = –0.26), and perspective-taking (r = –0.17). In Iran, criterion validity with the BDI was confirmed with coefficients ranging from –0.48 to 0.42. In the current study, Cronbach's alpha was 0.79.

Hardiness Questionnaire: According to Stoltz (1997), hardiness is a numerical measure obtained using the Hardiness Profile, with higher scores indicating greater resilience in the face of adversity. The score is derived from four subscales assessing control, ownership, reach, and endurance (C.O.R.E). The Hardiness Profile is a standardized, forced-choice instrument that reveals individual response patterns to challenging situations. As noted by Peak Learning (2019), it is based on over 37 years of research across 1,500 global studies in 51 countries. The latest version (v1.8) is accessible online with permission for research use. For implementation ease, the tool was adapted into a paper-based version from the online format, and was translated and back-translated by bilingual experts. The questionnaire presents 14 different scenarios, with four repeated questions per scenario representing each C.O.R.E. subscale, totaling 56 items scored on a 5-point Likert scale. The scale is standardized across diverse nationalities and ethnicities, and is not dependent on gender, age, or race. The overall Cronbach's alpha reported for the Hardiness Profile was 0.90, exceeding that of many standard psychological assessments. In Iran, Naeimi (2009) reported an alpha of 0.78 in this study, with noted discrepancies from the original version, especially in the endurance subscale (E), where reliability was 0.20 points lower. Despite this, the instrument still demonstrated acceptable reliability. Scores range from 40 to 201, with a global mean of 150.5. Distributions span over two standard deviations from the mean, forming a bell curve. Subscale scores range from 10 to 50. In earlier editions, the average age of respondents was 38 years, ranging from 15 to 77, though the updated version lacks specific age data. In the current study, validity was assessed using parallel and dual methods, with Cronbach's alpha for the total scale at 0.90, and for subscales as follows: control = 0.63, ownership = 0.51, reach = 0.48, endurance = 0.45.

2.3. Data Analysis

Given the nature of the research question and hypotheses, structural equation modeling (SEM) was used for analysis. Statistical analysis was conducted using SPSS v25 and SmartPLS software.

3. Findings and Results

Table 1 presents the central tendency and dispersion indices for the research variables. It is noteworthy that the minimum and maximum values for each variable are 1 and 5, respectively.

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Table 1

Descriptive Statistics of Research Variables

Dimension	Mean	Standard Deviation	Skewness	Kurtosis
Self-Blame	3.37	0.62	0.22	–0.34
Other-Blame	3.23	0.78	–0.06	0.37
Rumination	3.22	0.79	–0.02	–0.15
Catastrophizing	3.26	0.75	–0.04	–0.19
Acceptance	3.24	0.76	0.05	0.07
Positive Refocusing	3.19	0.77	–0.03	0.35
Refocus on Planning	3.27	0.86	–0.09	–0.24
Positive Reappraisal	3.28	0.93	0.13	–0.38
Putting into Perspective	3.32	0.71	–0.06	0.41
Hardiness	3.30	0.75	–0.05	–0.54
High-Risk Sexual Behaviors	3.39	0.80	–0.12	–0.09

Table 1 displays statistical indices including the mean, standard deviation, skewness, and kurtosis for the research variables. Considering that the skewness and kurtosis values fall within the acceptable range (–2 to +2), the assumption of normal distribution of the data can be considered valid.

Table 2

Correlation Matrix Between Research Variables

Construct	Hardiness	High-Risk Sexual Behaviors
Self-Blame	0.702**	0.771**
Other-Blame	0.809**	0.914**
Rumination	0.559**	0.621**
Catastrophizing	0.676**	0.723**
Acceptance	0.658**	0.663**
Positive Refocusing	0.688**	0.686**
Refocus on Planning	0.571**	0.611**
Positive Reappraisal	0.508**	0.533**
Putting into Perspective	0.573**	0.545**

As seen in Table 2, the ** symbol indicates that the correlations between the research variables are statistically significant at the 0.01 level. This means that there is a significant relationship between all research variables.

Table 3

Fornell–Larcker Criterion for Research Variables

Dimension	Hardiness	Self-Blame	Other-Blame	Rumination	Catastrophizing	Acceptance	Positive Refocusing	Refocus on Planning	Positive Reappraisal	Putting into Perspective	High-Risk Sexual Behaviors
Hardiness	0.774										
Self-Blame	0.576	0.748									
Other-Blame	0.568	0.559	0.754								
Rumination	0.548	0.539	0.528	0.768							
Catastrophizing	0.529	0.521	0.516	0.507	0.714						
Acceptance	0.510	0.505	0.496	0.483	0.470	0.761					
Positive Refocusing	0.479	0.468	0.455	0.443	0.435	0.429	0.760				
Refocus on Planning	0.459	0.449	0.438	0.429	0.423	0.417	0.391	0.707			

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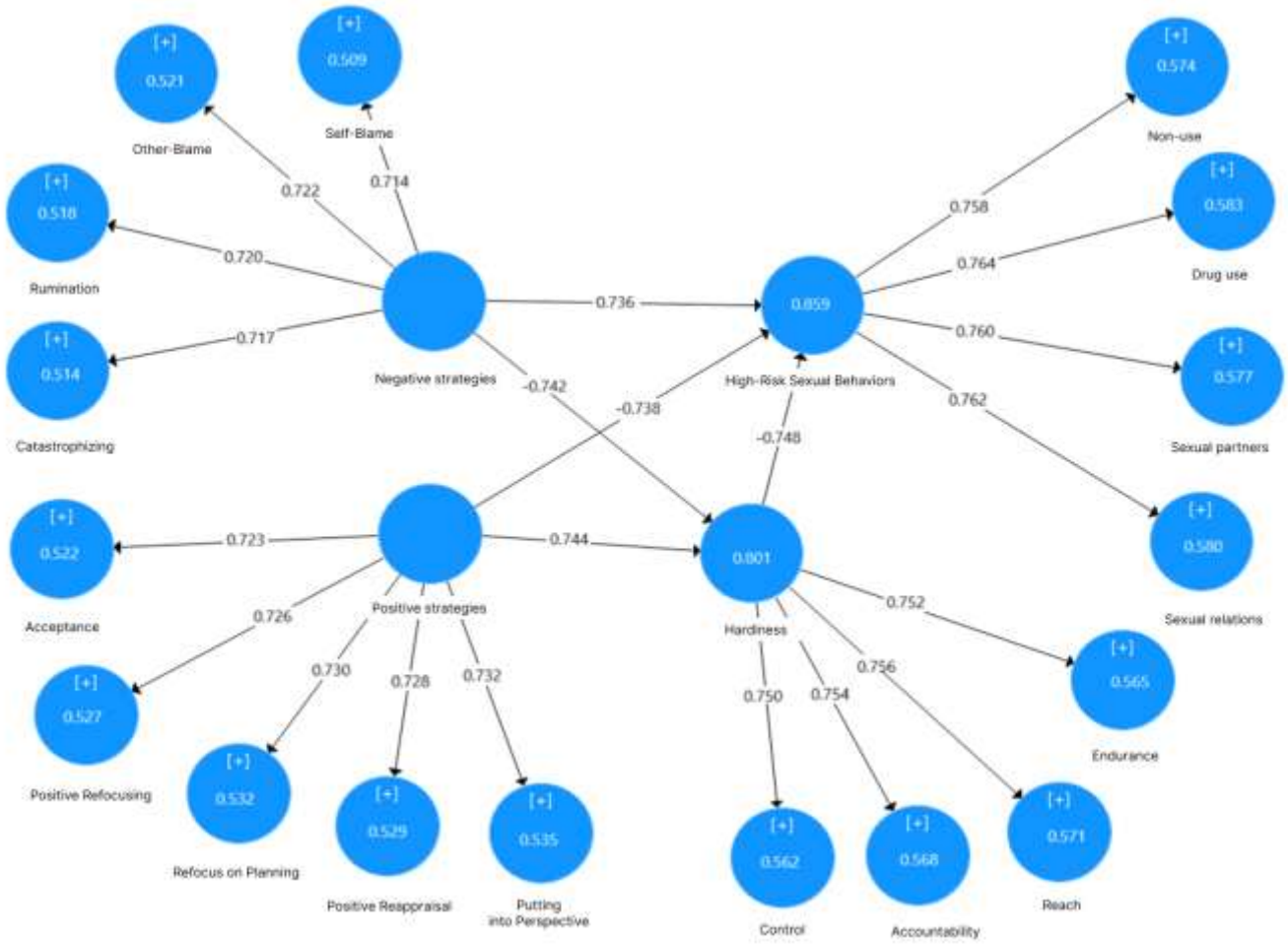
Positive Reappraisal	0.399	0.386	0.374	0.366	0.349	0.337	0.325	0.318	0.721		
Putting into Perspective	0.374	0.369	0.352	0.348	0.338	0.326	0.319	0.303	0.281	0.741	
High-Risk Sexual Behaviors	0.327	0.311	0.302	0.299	0.268	0.251	0.248	0.233	0.220	0.216	0.781

As shown in Table 3, the square root of AVE (diagonal elements) for each variable is greater than its correlations with other variables. This confirms the discriminant validity of the model. Given the confirmed validity and reliability of the measurement model, it is now possible to proceed with evaluating the structural model and testing the research hypotheses.

Figure 1

Model with Standardized Coefficients



As shown in the above figure, the factor loadings for all components and indicators are above 0.40, indicating an acceptable level of explanation of the indicators for each component and of the components for each dimension. The figure below presents the significance (t-values) of the model coefficients.

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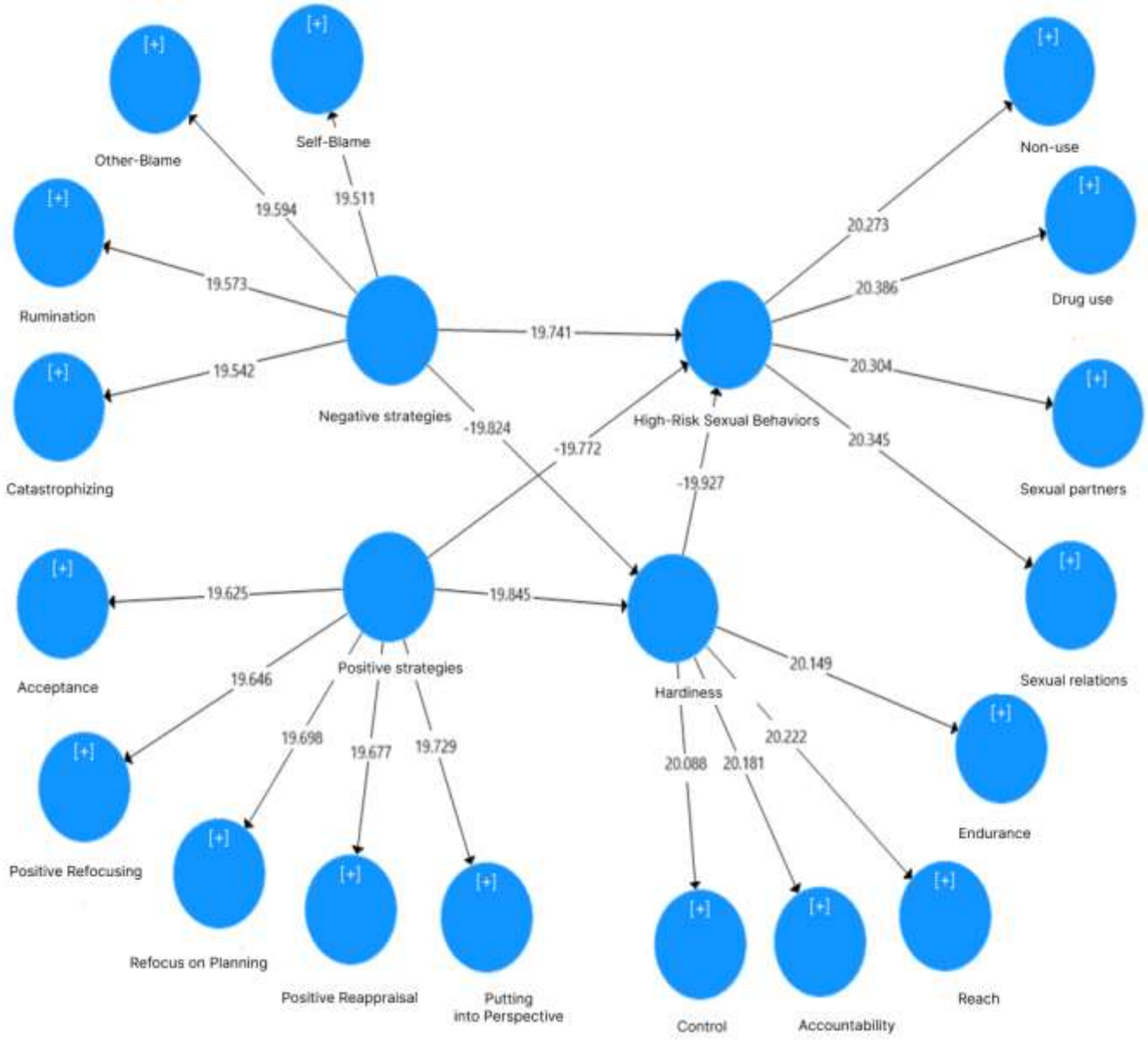
Figure 2

Model with Significance (t-values) of Coefficients



As observed in the above figure, the t-value for each indicator and component exceeds 2.58. Therefore, at a 99% confidence level, all indicators for each component and all components for each dimension are statistically confirmed, and no indicator or component requires elimination. Table 4 presents the path coefficients along with their significance values. As seen, all hypothesized paths are supported.

Table 4

Path Coefficients, t-values, and Their Status

Path	Path Coefficient	t-value	Status
Negative Strategies → Risky Behaviors	0.736	19.741	Confirmed
Negative Strategies → Hardiness	–0.742	–19.824	Confirmed
Positive Strategies → Risky Behaviors	–0.738	–19.772	Confirmed
Positive Strategies → Hardiness	0.744	19.845	Confirmed
Hardiness → Risky Behaviors	–0.748	–19.927	Confirmed

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The software provides path coefficients and corresponding significance values for each coefficient. At the 95% confidence level, a significance value (t) greater than 1.96 indicates confirmation of the respective hypothesis. Table 4 presents the research hypotheses along with their correlation coefficients and significance levels. As seen, the third sub-hypothesis—"Cognitive emotion regulation styles affect high-risk sexual behaviors of female high school students with the mediating role of hardiness (both directly and indirectly)"—is confirmed. It should be noted that if the significance value exceeds 2.58, the relationship is also significant at the 99% confidence level. To examine the magnitude of direct and indirect effects of independent variables on the dependent variable, total, direct, and indirect effects must be presented, as shown in the table below.

Table 5

Decomposition of Direct and Indirect Effects

Independent Variable	Dependent Variable	Effect Type	Effect Value
		Direct	Indirect
Negative Strategies	Hardiness	–0.742	---
Negative Strategies	Risky Behaviors	0.736	0.742×–0.748 = 0.555
Positive Strategies	Hardiness	0.744	---
Positive Strategies	Risky Behaviors	–0.738	0.744×–0.748 = –0.556
Hardiness	Risky Behaviors	–0.748	---

The effect of negative strategies on risky sexual behaviors, mediated by hardiness, is 1.291. The effect of positive strategies on risky sexual behaviors, mediated by hardiness, is –1.294. Therefore, it can be inferred that cognitive emotion regulation styles influence high-risk sexual behaviors in female high school students both directly and indirectly through the mediating role of hardiness. It is worth reiterating that a significance value greater than 2.58 indicates statistical significance at the 99% confidence level.

4. Discussion and Conclusion

The present study aimed to develop and test a structural model of high-risk sexual behaviors (RSBs) among female high school students based on cognitive emotion regulation (CER) strategies, with psychological hardiness as a mediating variable. The results revealed significant direct and indirect relationships between both negative and positive CER strategies and RSBs. Specifically, negative strategies (e.g., self-blame, rumination, catastrophizing) positively predicted engagement in RSBs, whereas positive strategies (e.g., positive reappraisal, acceptance, refocusing) were negatively associated with such behaviors. Additionally, psychological hardiness mediated the relationship between both types of CER strategies and RSBs, suggesting a central protective role in adolescent health behavior.

The path coefficients showed that negative CER strategies had a strong positive effect on RSBs (β = 0.736), while also negatively affecting hardiness (β = –0.742). This implies that adolescents who frequently use maladaptive emotion regulation mechanisms are not only more likely to engage in sexual risk behaviors but also exhibit lower psychological resilience. In contrast, positive CER strategies were associated with a significant decrease in RSBs (β = –0.738) and an increase in psychological hardiness (β = 0.744). Importantly, hardiness itself was found to negatively predict RSBs (β = –0.748), affirming its mediating role. These findings validate the hypothesized model and emphasize the psychological interplay between emotional regulation, resilience, and risky sexual decision-making in adolescent girls.

These results align with previous studies that have established the predictive role of emotion regulation in adolescent health-risk behaviors. For example, Mitchell et al. (2023) highlighted that individuals with histories of self-harm or impulsivity are more likely to use maladaptive CER strategies, increasing their vulnerability to RSBs (Mitchell et al., 2023). Similarly, Kozubal et al. (2023) emphasized that the intensity of emotional experiences influences the selection of regulation strategies, with higher emotional arousal leading to greater reliance on maladaptive methods (Kozubal et al., 2023). Within the context of adolescence—an emotionally volatile period—this dynamic becomes critical in understanding behavioral outcomes such as sexual risk-taking. The present findings support this view and provide further evidence that adolescents using negative

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strategies are at heightened risk for engaging in unsafe sexual behaviors.

The mediating role of hardiness, as confirmed in this study, further corroborates findings from resilience research. Alenezi et al. (2024) demonstrated that hardiness operates as a buffer in the relationship between emotional traits and cyber delinquency among adolescents, suggesting a broad-spectrum protective role in youth behavior regulation (Alenezi et al., 2024). Chuning et al. (2024) found that hardiness moderates the impact of depression and anxiety on well-being, reinforcing its relevance as a resilience trait in emotionally taxing contexts (Chuning et al., 2024). In a similar vein, Liu et al. (2022) showed that hardiness enhances mental health through mechanisms such as social support and perceived control, which could explain its inverse relationship with RSBs in the present study (Liu et al., 2022).

Our results also resonate with studies that frame RSBs as maladaptive coping mechanisms used by adolescents to manage emotional distress. Singh (2024) argued that difficulties in emotional regulation mediate the relationship between personality traits such as neuroticism and health-risk behaviors in youth populations (Singh et al., 2024). Rahman et al. (2024) emphasized the role of adverse childhood experiences and cultural displacement in shaping emotion regulation patterns, which in turn predict sexual risk behaviors among Hispanic youth (Rahman et al., 2024). These findings parallel the current study's emphasis on the cognitive-emotional antecedents of sexual risk and suggest that regulatory mechanisms, shaped by both internal dispositions and external circumstances, are key to understanding adolescent RSBs.

Moreover, the direct relationship between positive CER strategies and lower RSB engagement is consistent with research that highlights the protective value of adaptive regulation styles. For instance, Margaretha et al. (2023) found that adolescents employing positive reappraisal and planning-focused strategies were less likely to take risky actions, even in emotionally intense situations (Margaretha et al., 2023). McDonald et al. (2022) also observed that personal hardiness mediates the effect of minority stress on psychological distress, further indicating that inner psychological strengths mitigate behavioral maladjustments (McDonald et al., 2022). Similarly, Mina and Amini Manesh (2021) identified emotional dysregulation as a strong predictor of RSBs in adolescent girls, noting that deficiencies in emotional differentiation and assertiveness contributed to heightened behavioral risk (Mina & Amini Manesh, 2021).

The present findings are particularly significant in the context of conservative cultural settings where open discussions about sexuality remain taboo, and adolescents may lack access to comprehensive sexual education. As Chalooyi et al. (2023) showed, educational interventions can significantly improve knowledge and reduce RSBs among girls, suggesting that training in emotional and cognitive regulation could serve as an equally potent preventive measure (Chalooyi et al., 2023). The interplay between CER strategies and RSBs also mirrors earlier findings from Zarei et al. (2019), who confirmed the mediating role of cognitive emotion regulation in the relationship between attachment and risky sexual behavior among adolescents (Zarei et al., 2019).

From a behavioral perspective, the results support the theory that emotion regulation is not only a response mechanism but also a determinant of goal-directed behavior. As posited by Mozaffari (2022), executive function and emotion regulation jointly predict adolescent risk-taking, reinforcing the dual-process understanding of adolescent behavior (Mozaffari, 2022). The structural equation model validated in this study similarly supports this theoretical stance by positioning hardiness as a higher-order self-regulatory trait that integrates cognitive-emotional input and behavioral output.

Additionally, several studies have found that externalizing behaviors such as drug and alcohol use often co-occur with RSBs, reinforcing the idea of a common cognitive-emotional pathway (Basiru et al., 2024; Cho & Yang, 2023; Hubach et al., 2021). These behaviors may reflect an underlying regulatory deficit, where the absence of effective cognitive control and psychological hardiness leads to impulsive and risk-laden choices. Indeed, Ahadi et al. (2021) emphasized environmental contributors such as community disorganization and peer pressure in addiction vulnerability, which may intersect with emotional dysregulation to exacerbate risk behaviors (Ahadi et al., 2021).

In sum, the results of this study confirm a multi-pathway model in which both maladaptive and adaptive CER strategies significantly predict RSBs, with psychological hardiness functioning as a robust mediating factor. This integrative model not only enriches existing frameworks of adolescent sexual behavior but also highlights critical leverage points for intervention.

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Despite its theoretical and practical contributions, this study is not without limitations. First, the use of self-report questionnaires may introduce bias due to social desirability or underreporting, particularly given the cultural sensitivity of topics such as sexual behavior among female adolescents. Second, the cross-sectional design limits the ability to infer causality between variables. Longitudinal studies are necessary to determine the temporal ordering of cognitive regulation, hardiness, and risk behavior. Third, the sample was drawn from high schools in a single geographic area, which may restrict the generalizability of findings to other regions or populations with different cultural, religious, or socio-economic contexts. Additionally, the exclusion of male students precludes a comprehensive gender-based comparison of regulatory mechanisms and their influence on RSBs.

Future research should address these limitations by employing longitudinal and mixed-methods designs to explore how changes in emotion regulation and hardiness over time influence sexual risk-taking. Experimental studies assessing the impact of specific CER training programs on behavioral outcomes would provide stronger causal evidence. Incorporating neurobiological and psychophysiological measures of emotion regulation could offer a more holistic understanding of regulatory processes. Cross-cultural comparisons are also warranted to explore how social norms and religious values modulate the relationship between cognitive regulation, resilience, and risky behaviors. Finally, studies should examine the potential moderating roles of variables such as gender identity, socioeconomic status, and family structure in shaping these relationships.

The findings of this study suggest that preventive interventions aimed at reducing adolescent RSBs should include training in cognitive emotion regulation strategies, particularly those that foster positive reframing, acceptance, and planning. Programs should also aim to cultivate psychological hardiness through activities that promote control, commitment, and adaptability in stressful situations. School-based mental health services can play a pivotal role in screening for emotion regulation difficulties and implementing resilience-building curricula. Educators and counselors should also engage families and caregivers to ensure a supportive home environment that reinforces adaptive coping. In culturally conservative societies, interventions must be sensitively tailored to align with local norms while promoting psychological competencies that protect against risky behavior.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

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

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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