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Explaining Adolescent Risk Behaviors Based on Adverse Childhood Experiences and Psychological Status with the Mediating Role of Moral Competencies: A Comparative Model Study in Girls and Boys

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A B S T R A C T

Purpose: The present study investigated the structural relationships between health-related risk behaviors, adverse childhood experiences, and psychological status by examining the mediating role of protective moral competencies.

Methods and Materials: This correlational study was conducted using structural equation modeling. The statistical population included all upper secondary school students in Semnan County during the final quarter of the 2023–2024 academic year. The sample consisted of 1,084 students selected through cluster sampling. Data were collected using the Adolescent Risk-Taking Questionnaire developed by Alizadeh Mohammadi and Ahmadabadi (Alizadeh Mohammadi & Ahmadabadi, 2008), the Moral Competency Questionnaire developed by Martin and Austin (Martin & Austin, 2010), the Childhood Trauma Questionnaire developed by Vanderhart and Vanderlinden (Vanderhart & Vanderlinden, 1999), the NEO Personality Inventory (Costa & McCrae, 1985) (neuroticism dimension only), and the Dark Future Scale developed by Zaleski et al. (Zaleski et al., 2017).

Findings: The findings indicated that the indicator variables of risk behaviors and protective moral values loaded significantly and consistently onto these latent constructs ($t > 1.96$). The effect of protective moral values on risk behaviors was negative and significant. The effects of adverse childhood experiences, unfavorable psychological status, and dark future perception on risk behaviors were positive and significant. In addition, the effects of adverse childhood experiences, unfavorable psychological status, and dark future perception on moral values were negative and significant. The indirect effects of adverse childhood experiences, unfavorable psychological status, and dark future perception on risk behaviors through the mediating role of protective moral values were also significant.

Conclusion: The findings emphasized the importance of designing and implementing school-based and family-based interventions focused on strengthening protective moral competencies, promoting mental health, and improving adolescents' attitudes toward the future. Such approaches may serve as preventive strategies for reducing health-related risk behaviors during adolescence.

Keywords: *Risk behaviors, protective moral values, adverse childhood experiences, psychological status, dark future.*

1. Introduction

Adolescence is a sensitive developmental period in which biological maturation, identity formation, expanding peer relationships, emotional reactivity, and growing autonomy jointly increase exposure to health-related risk behaviors. These behaviors may include substance use, alcohol consumption, smoking, risky driving, violence, unsafe sexual behaviors, and other forms of behavioral dysregulation that can compromise physical, psychological, social, and educational functioning. From a public health perspective, adolescent risk behaviors are especially important because many preventable health problems in adulthood have their roots in behavioral patterns established during adolescence. The World Health Organization emphasizes that adolescence and young adulthood are critical windows for prevention, because health-compromising behaviors frequently emerge during this period and may persist into later life if not addressed through timely psychosocial, educational, and family-based interventions (World Health, 2021). Similarly, evidence-based calls for improving adolescent health stress that reducing risk behaviors requires attention not only to immediate behavioral outcomes but also to the developmental, psychological, and social mechanisms that shape vulnerability and resilience during this life stage (Weiss & Ferrand, 2019). Therefore, explaining adolescent risk behaviors requires an integrated model that considers early adversity, current psychological functioning, future-oriented cognition, and protective moral capacities.

Health-related risk behavior in adolescence is a multidimensional construct rather than a single behavioral tendency. Systematic evidence indicates that adolescent risk behaviors are associated with individual, family, peer, socioeconomic, and psychological factors, suggesting that risk engagement is often the outcome of overlapping vulnerability systems rather than isolated decision-making (Bozzini et al., 2020). Recent findings also show that personality traits are related to health-risk behavior among male and female adolescents, supporting the view that dispositional tendencies and psychological characteristics influence how adolescents perceive, approach, or avoid risky situations (Yadav & Misra, 2025). Age and gender are also important in specific behavioral domains such as road safety, where risky driving and accident vulnerability vary according to developmental and gender-related patterns of risk perception, sensation seeking, and behavioral control (McCarty & Kim, 2024). These findings are consistent with research showing that personality and gender influence adolescent risk perception and risk-taking behavior, meaning that adolescent risk cannot be adequately understood without considering both psychological disposition and gender-specific developmental contexts (Reniers et al., 2016).

A major etiological factor in adolescent maladjustment is adverse childhood experiences. Adverse childhood experiences refer to potentially traumatic or chronically stressful events occurring before adulthood, including abuse, neglect, household dysfunction, exposure to violence, and other forms of developmental adversity. The World Health Organization's Adverse Childhood Experiences International Questionnaire reflects the increasing global recognition that early adversity must be systematically assessed because it can have long-term effects on mental health, interpersonal functioning, and health-risk behaviors (World Health, 2018). Empirical studies also show that traumatic childhood experiences can predict later psychological difficulties through maladaptive cognitive and emotional pathways. For example, childhood trauma has been associated with binge eating disorder through early maladaptive schemas, indicating that early adverse experiences may become internalized as dysfunctional self-beliefs and emotion-regulation patterns (Haji Seyed Taghiataghavi et al., 2021). In broader trauma research, adverse childhood experiences have also been linked to moral injury and psychological distress, showing that childhood adversity can shape not only emotional functioning but also moral self-evaluation and value-based functioning (Battaglia et al., 2019). Similarly, research on public safety personnel indicates that adverse childhood experiences may intensify mental health symptoms, particularly when combined with morally injurious experiences, suggesting that trauma and moral functioning may be closely connected across developmental and occupational contexts (Roth et al., 2022).

The link between childhood adversity and adolescent risk behavior is especially important because traumatic experiences may impair self-regulation, increase emotional distress, distort interpersonal expectations, and weaken future-oriented decision-making. Childhood sexual abuse, for instance, has been shown to have long-term sequelae for risky sexual behavior, demonstrating how early trauma can affect later health-related behavior through psychological vulnerability and altered relational scripts (Chen et al., 2023). Sexual abuse prevention education studies further emphasize that prevention must begin early and should be

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embedded in school-based programming, because childhood and adolescent safety are strongly shaped by awareness, protection skills, and institutional responsiveness (Walsh et al., 2019). These findings imply that trauma-related risk pathways are not merely clinical concerns but also educational and public health concerns. When adolescents carry unresolved adverse experiences into secondary school years, they may be more likely to engage in behaviors that provide temporary emotional relief, peer acceptance, identity assertion, or avoidance of distress, even when such behaviors expose them to long-term harm.

Psychological status is another central predictor of adolescent risk behavior. Psychological distress, neuroticism, anxiety, depressive symptoms, emotional instability, and reduced psychological capital may increase the likelihood of risk engagement by weakening self-control, increasing impulsive coping, and reducing the adolescent's capacity to evaluate consequences. Research on psychological capital and mental health in children and adolescents shows that positive psychological resources are closely related to better mental health, indicating that hope, resilience, optimism, and self-efficacy may function as protective assets against maladjustment (Finch et al., 2020). Intervention research with vulnerable female youth has similarly shown that enhancing psychological capital can improve health outcomes, supporting the idea that psychological resources have practical preventive value in high-risk adolescent groups (Rew et al., 2017). Conversely, psychological vulnerability may intensify behavioral risk. The COVID-19 pandemic literature demonstrated that large-scale stressors can adversely affect mental health in the general population, reinforcing the broader principle that psychological distress can alter coping behavior and increase vulnerability to maladaptive outcomes (Xiong et al., 2020).

Among personality-related indicators of psychological vulnerability, neuroticism is especially relevant. Neuroticism reflects a tendency toward negative affect, emotional instability, anxiety, worry, irritability, and heightened sensitivity to stress. Longitudinal personality research shows that personality traits predict important health outcomes, including mortality risk, indicating that personality is not merely descriptive but has meaningful implications for long-term health trajectories (Graham et al., 2017). Research on healthy neuroticism further suggests that neuroticism may relate to health behaviors in complex ways, depending on whether emotional sensitivity is accompanied by conscientious regulation or, conversely, by impulsive and maladaptive coping (Graham et al., 2020). In adolescence, elevated neuroticism may increase risk behaviors when emotional distress is not balanced by self-control, future orientation, or moral self-regulation. Thus, neuroticism and unfavorable psychological status can be conceptualized as risk-amplifying factors that may increase adolescents' reliance on maladaptive behaviors as a means of regulating negative affect.

Future-oriented cognition is also essential in explaining adolescent behavior. Adolescents do not only respond to present emotions and peer contexts; they also act on the basis of how they imagine their future. A hopeful and structured future orientation may encourage delayed gratification, academic investment, self-protection, and prosocial behavior, whereas a dark perception of the future may weaken motivation to avoid harm. Studies show that self-esteem and future orientation predict adolescents' risk engagement, meaning that adolescents who hold more positive views of themselves and their future may be less likely to engage in harmful behaviors (Jackman & MacPhee, 2017). The Dark Future Scale was developed to assess anxious, uncertain, and catastrophic expectations about the future, and its validation underscores the psychological importance of measuring dark future perception as a specific cognitive-affective construct (Zaleski et al., 2019). When adolescents believe that their future is threatening, unstable, or hopeless, the perceived value of self-protection may decline, and immediate gratification or escape-based behaviors may become more attractive.

Socioeconomic and contextual factors further complicate the relationship between psychological vulnerability and risk behavior. Socioeconomic risk has been linked to adolescent cognitive control and emerging risk-taking behaviors, suggesting that environmental adversity may impair the regulatory systems needed to resist risk opportunities (Brieant et al., 2020). Research among Chinese adolescents also shows that socioeconomic status is associated with risk-taking behavior through psychological capital and self-control, indicating that internal psychological resources mediate the effects of structural disadvantage (Jia et al., 2021). Similarly, socioeconomic status and problem behaviors in young children have been explained through parenting styles and family structure, confirming that risk pathways may begin before adolescence and are shaped by family socialization processes (Lin et al., 2023). Among highly vulnerable populations, such as young people experiencing homelessness, substance-use typologies reveal that risk behaviors can cluster into distinct patterns, reflecting the interaction of social adversity, emotional

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distress, and survival-based coping (Brown et al., 2024). Research on adolescent refugees also indicates that health-risk behaviors may be heightened in populations exposed to displacement, instability, and accumulated stressors, further emphasizing the developmental consequences of adversity (Hirani et al., 2018).

Alongside risk factors, moral competencies and moral values may serve as protective mechanisms. Moral competence refers to the adolescent's capacity to recognize moral obligations, care for others, accept responsibility, acknowledge mistakes, commit to right action, and regulate behavior according to internalized ethical standards. Longitudinal evidence indicates reciprocal relationships between moral competence and externalizing behavior in junior secondary students, suggesting that moral development may reduce problem behaviors while behavioral problems may also undermine moral functioning over time (Shek & Zhu, 2019). This reciprocal framework is particularly important for the present study because it suggests that moral competencies may not simply be outcomes of development but active regulatory capacities that shape behavior under conditions of psychological and environmental risk. In organizational and cross-national research, moral values have also been associated with well-being, resilience, and performance, indicating that value-based functioning can support adaptive psychological outcomes beyond adolescence (Athota et al., 2020). Although this evidence comes from adult and occupational contexts, it supports the broader proposition that moral values are psychologically protective because they provide an internal framework for self-regulation, responsibility, and resilience.

Positive psychology research provides additional support for the protective role of moral and character strengths. Character strengths have been shown to predict resilience beyond positive affect, self-efficacy, optimism, social support, self-esteem, and life satisfaction, suggesting that strengths-based capacities contribute uniquely to adaptive functioning (Martinez-Marti & Ruch, 2017). Longitudinal evidence also shows that mindful awareness of character strengths can enhance psychological well-being, partly through mediating psychological mechanisms that support self-reflection and adaptive functioning (Duan & Ho, 2018). These findings are relevant to adolescent risk behavior because moral competencies can be understood as character-based strengths that support self-control, empathy, responsibility, and future-sensitive decision-making. If adolescents possess stronger moral competencies, they may be better able to resist peer pressure, regulate impulses, evaluate consequences, and choose behaviors consistent with long-term well-being.

Gender comparison is also necessary in models of adolescent risk behavior. Gender may shape both the prevalence of specific risk behaviors and the psychological mechanisms underlying those behaviors. For example, research on risky online behavior shows that the factors explaining risk engagement differ by gender, indicating that boys and girls may follow partially distinct pathways toward behavioral risk (Sasson & Mesch, 2016). Risk perception studies similarly show gender differences in adolescent risk-taking, suggesting that boys and girls may vary in sensation seeking, social expectations, perceived consequences, and emotional regulation (Reniers et al., 2016). In road safety research, age and gender differences are also important predictors of accident-related risk, demonstrating that behavioral risk must be interpreted through a developmental and gender-sensitive lens (McCarty & Kim, 2024). Therefore, a comparative model in girls and boys can clarify whether adverse childhood experiences, psychological status, dark future perception, and moral competencies operate similarly across gender groups or whether the strength of direct and indirect pathways differs.

Despite the growing evidence on adolescent risk behaviors, several gaps remain. First, many studies examine isolated predictors such as personality, trauma, socioeconomic status, or future orientation, whereas fewer studies integrate these variables into a single structural model. Second, although moral competence has been linked to externalizing behavior, its mediating role in the relationship between adverse childhood experiences, psychological vulnerability, dark future perception, and health-related risk behaviors remains insufficiently examined. Third, gender-sensitive structural comparisons are needed because boys and girls may differ not only in mean levels of risk behavior but also in the psychological and moral mechanisms through which risk emerges. Fourth, in school populations, prevention-oriented models are particularly valuable because schools provide practical contexts for screening, psychoeducation, moral development programs, and family-school interventions. Taken together, the literature suggests that adolescent risk behavior may be best understood as the result of a pathway in which early adversity and unfavorable psychological status increase risk directly while also weakening protective moral competencies, thereby indirectly increasing engagement in harmful behaviors.

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The aim of the present study was to explain health-related risk behaviors among adolescent girls and boys based on adverse childhood experiences and psychological status by examining the mediating role of protective moral competencies in a comparative structural equation model.

2. Methods and Materials

2.1. Study Design and Participants

This study was a cross-sectional, descriptive-correlational investigation conducted using structural equation modeling (SEM). The statistical population consisted of all upper secondary school students in Semnan County during the final quarter of the 2023–2024 academic year. The sample included 1,084 students selected through cluster sampling. The sample size was determined based on sampling principles in structural equation modeling. According to Peter M. Bentler (Bentler, 1995), sample size in SEM should be determined according to the number of estimable parameters, such that the sample-to-parameter ratio is at least 5:1 or ideally 10:1, and optimally 50:1. Since 41 parameters were estimated in the present study, the required sample size based on a 50:1 ratio was 1,050 participants.

The inclusion criteria were as follows: (1) students were not foreign nationals (verified through teachers' reports); (2) students did not have physical disabilities (verified through observation of physical appearance and teachers' reports); and (3) students did not suffer from acute or chronic physical illnesses (verified through self-report and confirmation by classroom teachers). Incomplete or distorted questionnaire responses constituted the exclusion criterion.

In this study, from upper secondary schools across the four geographical regions of Semnan County, one public girls' high school and one public boys' high school, one non-profit girls' high school and one non-profit boys' high school, and one vocational girls' school and one vocational boys' school were selected. In total, 12 boys' high schools/vocational schools and 12 girls' high schools/vocational schools (24 schools overall) were selected. From each school, one second-grade and one third-grade classroom were randomly selected by lottery. Overall, 48 classrooms participated in the study (some students were excluded based on the inclusion criteria and informed consent requirements). First, the inclusion criteria were evaluated. Subsequently, questionnaires were distributed in classrooms at the beginning of class sessions in coordination with school staff and teachers. Prior to administration, students received sufficient explanations regarding the importance of the study, honesty in responding, voluntary participation, confidentiality of information, estimated time required for questionnaire completion, and procedures used to ensure anonymity. Students were free to submit completed questionnaires either directly to the researcher, to the class representative, or into a designated collection box prepared for completed questionnaires.

2.2. Measures

Risk Behaviors Questionnaire: To assess this variable, the Adolescent Risk-Taking Questionnaire developed by Alizadeh Mohammadi and Ahmadabadi (Alizadeh Mohammadi & Ahmadabadi, 2008) was used. This instrument was developed based on the Adolescent Risk-Taking Questionnaire by Golden et al. and the Adolescent Risk Behavior Control System (2004), while taking into account the cultural conditions and social limitations of Iranian society. The instrument consists of 38 items assessing tendencies toward seven risky behaviors: (1) dangerous driving (Items 1–6), (2) violence (Items 7–12), (3) cigarette smoking (Items 13–16), (4) substance use (Items 17–24), (5) alcohol consumption (Items 25–30), (6) relationships with the opposite sex (Items 31–34), and (7) sexual relationships and behaviors (Items 35–38). Responses are scored on a 5-point Likert scale ranging from 1 to 5. Higher scores indicate a greater tendency toward risky behaviors, and vice versa. Content validity was confirmed through expert evaluation and alignment with international instruments (Golden et al., 2004). Construct and factorial validity were supported through confirmatory factor analysis (CFA), with factor loadings above 0.40 and satisfactory model fit indices (e.g., CFI > 0.90 and RMSEA < 0.08). Criterion validity was established through significant positive correlations with external indicators such as disciplinary records, substance use, and scores on other validated risk behavior measures. Cronbach's alpha coefficients for the aforementioned factors were reported as 0.74, 0.93, 0.90, 0.90, 0.78, 0.83, and 0.87, respectively (Alizadeh Mohammadi & Ahmadabadi, 2008). In the present study, Cronbach's alpha coefficients were 0.75, 0.91, 0.89, 0.92, 0.80, 0.84, and 0.90, respectively. The "relationships with the opposite sex" subscale was not administered in this study.

Moral Competencies Scale: This questionnaire was developed by Martin and Austin to assess moral competence. It consists of 39 items and eight components,

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including: active care for others (Items 1–6), performing moral actions (Items 7–13), commitment to doing what is right (Items 14–17), self-sacrifice (Items 18–20), acknowledgment of one's mistakes (Items 21–24), acceptance of one's mistakes (Items 25–30), acceptance of others' mistakes (Items 31–37), and trust in others (Items 38–39). Responses are rated on a 5-point scale ranging from 1 to 5, with total scores ranging from 39 to 195. Higher scores indicate greater moral competence. Criterion validity was established through significant positive correlations with similar measures of moral values and social responsibility in the study conducted by Nadi and Moshfeghi (Nadi & Moshfeghi, 2015). Construct validity was supported by the eight-dimensional structure of the instrument and Cronbach's alpha coefficients above 0.70 for each subscale, with an overall coefficient of 0.81 in the present study, indicating satisfactory internal consistency and factorial structure. Confirmatory factor analysis supported factorial validity with indices such as CFI > 0.90, RMSEA < 0.08, and factor loadings greater than 0.40. Content, face, and criterion validity were also evaluated as satisfactory, and the Cronbach's alpha coefficient exceeded 0.70 (Nadi & Moshfeghi, 2015). In the present study, Cronbach's alpha coefficient was 0.81.

Childhood Traumatic Experiences Questionnaire: This checklist was developed by Vanderhart and Vanderlinden (Vanderhart & Vanderlinden, 1999). It contains 29 items with dichotomous yes/no responses. Excluding the two adulthood-related items, total scores range from 0 to 27. The developers reported convergent validity through correlations with the Childhood Stressful Experiences Scale and the Body Dissociation Self-Test Questionnaire. Construct validity was supported through factor analysis with factor loadings above 0.40 and acceptable model fit indices. Criterion validity was established through significant correlations with childhood stress and body dissociation measures. Internal consistency, based on Cronbach's alpha, was reported as 0.77. Reliability of the instrument was reported as 0.91 (Haji Seyed Taghi Taqavi et al., 2020). In the present study, Cronbach's alpha coefficient was 0.90.

NEO Five-Factor Personality Inventory (Neuroticism Dimension Only): This instrument was developed by Paul Costa and Robert McCrae. The inventory assesses five major personality factors using 60 items, with 12 items allocated to each factor. In the present study, only the neuroticism dimension was administered. Responses are scored from 0 to 4. The neuroticism items include Questions 1, 6, 11, 16, 21, 26, 31, 36, 41, 46, 51, and 56. Higher scores indicate higher levels of neuroticism. Construct validity was confirmed through confirmatory factor analysis and acceptable factor loadings. Criterion validity was supported through significant correlations with clinical indicators of anxiety and depression, concurrent validity with the Beck Anxiety Inventory, and predictive validity for psychological disorders. Divergent validity was also established through meaningful differentiation of this dimension from other personality traits such as extraversion and agreeableness. Internal consistency coefficients based on Cronbach's alpha ranged from 0.75 to 0.83 across factors (Haghshenas, 1999). In the present study, internal consistency coefficients ranged from 0.78 to 0.86.

Dark Future Perception Scale: This scale was developed by Piotr Zaleski and colleagues and assesses the tendency to think about the future with anxiety, uncertainty, and anticipation of future catastrophes. The scale contains six items rated on a 7-point Likert scale ranging from 0 to 6. It contains no reverse-scored items. Total scores range from 0 to 36, with higher scores indicating a darker perception of the future. Reliability, factorial structure, and validity of the Dark Future Scale have been confirmed. Its validity was evaluated through correlations with the Negative Future Scale (r = 0.79), Future Time Perspective Scale (r = 0.79), Zimbardo Time Perspective Inventory (r = 0.82), and Carpe Diem Scale (r = 0.86) (Zaleski et al., 2019). Internal consistency in the present study was 0.89.

2.3. Data Analysis

The data were analyzed using SPSS version 23 and LISREL version 8.8 through inferential structural equation modeling analyses.

3. Findings and Results

The number of female and male participants in this study was 549 (51%) and 533 (49%), respectively. The mean and standard deviation of the age of the participating students was 18.23 ± 0.86 years. The mean and standard deviation of age were 18.26 ± 0.85 years for female students and 18.21 ± 0.86 years for male students. A total of 405 students (37.4%) were in the second grade, and 655 students (60.4%) were in upper secondary education. Twenty-four students (2.2%) did not report their grade level. In addition, 137 students (12.6%) were enrolled in technical and vocational fields, 412 (38%) in experimental sciences, 352 (32.5%) in humanities, and 153 (14.1%) in mathematics. Thirty students (2.8%) did not report their field of study.

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Table 1

Means and Standard Deviations of the Research Variables

Variable	Component	Score Range	Boys M ± SD	Girls M ± SD
Health-related risk behaviors	Tendency toward risky driving	6–30	22.41 ± 4.74	15.54 ± 4.46
Health-related risk behaviors	Violence	6–30	19.52 ± 4.32	17.57 ± 4.19
Health-related risk behaviors	Cigarette smoking	4–20	15.32 ± 3.71	15.65 ± 3.63
Health-related risk behaviors	Substance use	8–40	21.32 ± 6.05	18.30 ± 6.18
Health-related risk behaviors	Alcohol consumption	6–30	22.42 ± 5.54	24.23 ± 5.27
Health-related risk behaviors	Sexual relationships and behaviors	4–20	12.32 ± 3.17	13.63 ± 3.19
Moral values	Active care for others	5–30	20.25 ± 5.45	22.08 ± 5.37
Moral values	Performing moral action	7–35	22.75 ± 6.01	23.61 ± 6.11
Moral values	Commitment to doing what is right	4–20	12.09 ± 3.91	13.12 ± 3.80
Moral values	Self-sacrifice	3–15	9.16 ± 3.15	8.42 ± 3.32
Moral values	Acknowledgment of one's own mistakes	4–20	10.78 ± 4.74	9.41 ± 4.48
Moral values	Acceptance of one's own mistakes	6–30	13.63 ± 5.45	12.73 ± 5.45
Moral values	Acceptance of others' mistakes	7–35	22.44 ± 5.32	23.28 ± 5.60
Moral values	Trust in others	2–10	6.34 ± 1.05	7.73 ± 1.14
Childhood traumatic experiences	—	0–27	12.75 ± 5.12	14.33 ± 5.03
Neuroticism	—	0–48	23.30 ± 6.84	24.35 ± 6.45
Dark future perception	—	6–42	28.76 ± 6.21	27.46 ± 6.85

Overall, the mean scores for health-related risk behaviors were relatively high, whereas moral values were reported at moderate to favorable levels. The mean scores for childhood traumatic experiences, neuroticism, and dark future perception were also at moderate levels in both groups. In the gender comparison, boys had higher mean scores in most components of risk behaviors, including risky driving, violence, and substance use, whereas girls obtained slightly higher scores in alcohol consumption and sexual relationships and behaviors. Regarding moral values, girls scored higher in most components, including active care for others, performing moral action, and acceptance of others' mistakes, while boys had a higher mean score in acknowledgment of one's own mistakes. In addition, the mean score of childhood traumatic experiences was slightly higher among girls, whereas no considerable difference was observed between the two groups in neuroticism and dark future perception.

General data screening: First, the data were examined to ensure the absence of atypical values and values outside the specifications of the relevant instruments. Missing data were examined for all variables, and missing values were replaced by the mean of the corresponding component. Multivariate outliers were examined using Mahalanobis distance and were removed based on the degrees of freedom and the corresponding chi-square value. Therefore, for inferential analysis, with 14 degrees of freedom and a corresponding chi-square value of 36.12 at the significance level of 0.001, 34 multivariate outliers were removed. Skewness and kurtosis values also did not exceed the critical value of ±1.

Examination of statistical assumptions: First, in this study, the normality of standardized residual values for endogenous variables (i.e., moral values and risk behaviors) was examined separately in two multiple regression analyses, and the plots showed that residual values were located within a maximum interval of 2 standard deviations from the mean, indicating that residual values had a normal distribution with a probability of 0.95. Second, the independence of errors assumption was examined using the Durbin–Watson index. In the models predicting moral values and risk behaviors from the predictor variables, the Durbin–Watson indices were 1.85 and 1.83, respectively, in the boys' model, and 1.47 and 1.63, respectively, in the girls' model, indicating that the independence of errors assumption was met. Third, the findings related to the absence of multicollinearity, assessed using the two complementary indices of tolerance and VIF, showed that in the model predicting moral values, tolerance values ranged from 0.86 to 0.94 in the boys' model and from 0.81 to 0.93 in the girls' model.

Model fit indices in the girls' model: Model fit indices were examined and extracted to evaluate model fit. In this study, the significance level of chi-square with 112 degrees of freedom was 0.001. The root mean square error of approximation (RMSEA) was 0.07. The goodness-of-fit index (GFI = 0.93), normed fit index (NFI = 0.91), incremental fit index (IFI = 0.92), relative fit index (RFI = 0.94), and parsimonious normed fit index (PNFI = 0.92) were obtained.

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Model fit indices in the boys' model: Model fit indices were examined and extracted to evaluate model fit. In this study, the significance level of chi-square with 112 degrees of freedom was 0.001. The root mean square error of approximation (RMSEA) was 0.06. The goodness-of-fit index (GFI = 0.93), normed fit index (NFI = 0.92), incremental fit index (IFI = 0.94), relative fit index (RFI = 0.93), and parsimonious normed fit index (PNFI = 0.91) were obtained.

Coefficients of determination (R^2): In the full models for boys and girls, respectively, 0.64 and 0.67 of the variance in risk behaviors was explained by the full model. In addition, 0.44 and 0.51 of the variance in moral values was explained by the exogenous variables. However, in the reduced model (without the mediating variable), this value was 0.52.

Table 2

Effects Among the Research Variables

Effect	Path / Indicator	Boys B	Boys SE	Boys t	Boys β	Girls B	Girls SE	Girls t	Girls β
Factor loadings	Risky driving	1.00	—	—	0.783	1.00	—	—	0.773
Factor loadings	Violence	1.048	0.041	25.80	0.762	1.07	0.042	25.69	0.769
Factor loadings	Cigarette smoking	0.585	0.031	18.81	0.577	0.613	0.032	19.40	0.597
Factor loadings	Substance use	1.04	0.046	22.88	0.687	1.07	0.047	22.93	0.695
Factor loadings	Alcohol consumption	0.948	0.038	25.00	0.742	0.942	0.039	24.15	0.727
Factor loadings	Sexual relationships and behaviors	0.547	0.029	18.86	0.578	0.553	0.030	18.66	0.576
Factor loadings	Care for others	1.00	—	—	0.742	1.00	—	—	0.753
Factor loadings	Performing moral action	1.14	0.046	24.97	0.778	1.14	0.044	21.68	0.785
Factor loadings	Commitment to doing what is right	0.654	0.031	21.30	0.668	0.647	0.030	21.68	0.671
Factor loadings	Self-sacrifice	0.343	0.025	13.94	0.444	0.340	0.024	14.11	0.446
Factor loadings	Acknowledgment of one's own mistakes	0.580	0.029	20.25	0.637	0.560	0.028	20.07	0.624
Factor loadings	Acceptance of one's own mistakes	0.955	0.045	21.03	0.660	0.943	0.044	21.36	0.661
Factor loadings	Acceptance of others' mistakes	1.06	0.047	22.60	0.707	1.04	0.046	22.83	0.704
Factor loadings	Trust in others	0.310	0.017	18.47	0.583	0.296	0.016	18.05	0.565
Direct effects	Moral values → risk behaviors	-0.483	0.040	-12.12	-0.473	-0.439	0.039	-11.28	-0.466
Direct effects	Childhood traumatic experiences → risk behaviors	0.063	0.017	3.69	0.094	0.086	0.017	5.16	0.130
Direct effects	Psychological status → risk behaviors	0.116	0.014	8.29	0.241	0.163	0.016	10.41	0.338
Direct effects	Dark future perception → risk behaviors	0.146	0.020	7.21	0.199	0.066	0.018	3.62	0.091
Direct effects	Childhood traumatic experiences → moral values	-0.155	0.018	-8.57	-0.238	-0.172	0.018	-9.65	-0.255
Direct effects	Psychological status → moral values	-0.185	0.014	-13.09	-0.393	-0.269	0.015	-18.12	-0.549
Direct effects	Dark future perception → moral values	-0.193	0.021	-9.07	-0.268	-0.081	0.020	-3.99	-0.109
Indirect effects	Childhood traumatic experiences → risk behaviors	0.075	0.010	7.27	0.207	0.075	0.010	7.61	0.114
Indirect effects	Psychological status → risk behaviors	0.090	0.009	9.49	0.427	0.118	0.012	10.23	0.245
Indirect effects	Dark future perception → risk behaviors	0.093	0.012	7.57	0.326	0.035	0.009	3.79	0.049

Based on the results of Table 2, the factor loadings of the observed indicators on the latent constructs were at desirable and significant levels in both boys and girls; most standardized coefficients were in the range of 0.50 to 0.70, indicating an acceptable fit of the items with the constructs. In the direct effects section, the findings showed that moral values had a negative and significant effect on risk behaviors in both groups. In addition, childhood traumatic experiences had a positive and significant effect on the reduction of moral values. Furthermore, psychological status had a strong negative effect on moral values in both groups and also directly increased risk behaviors. Regarding indirect effects, childhood traumatic experiences, psychological status, and dark future perception were all found to indirectly increase risk behaviors through the reduction of moral values. This effect was particularly observed in the pathway from psychological status to risk behaviors among girls. Overall, the results indicate that moral values play an important mediating role in the relationship between trauma-related variables (childhood experiences, psychological status, and dark future perception) and risk behaviors, and this pattern was observable in both boys and girls, although the magnitude of effects differed across some pathways.

Bootstrap test: In the boys' model, the indirect effect of childhood traumatic experiences on risk behaviors through moral values was significant ($\beta = 0.207$, SE = 0.010, $t = 7.27$, $p < 0.001$, 95% CI [0.148, 0.246]). The indirect effect of psychological status on risk behaviors through moral values was also positive and significant ($\beta = 0.427$, SE = 0.009, $t = 9.49$, $p < 0.001$, 95% CI [0.355, 0.482]). In addition, dark future perception had a significant indirect effect on risk behaviors through moral values ($\beta = 0.326$, SE = 0.012, $t = 7.57$, $p < 0.001$, 95% CI [0.247, 0.391]). Therefore, in the boys' model, all three predictor variables played a

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significant role in increasing risk behaviors through moral values. Similar results were observed in the girls' model, with the difference that the magnitude of indirect effects was lower than in boys. The indirect effect of childhood traumatic experiences on risk behaviors through moral values was positive and significant (β = 0.114, SE = 0.010, t = 7.61, p < 0.001, 95% CI [0.081, 0.157]). Psychological status also had a positive and significant indirect effect on risk behaviors through moral values (β = 0.245, SE = 0.012, t = 10.23, p < 0.001, 95% CI [0.198, 0.301]). However, the indirect effect of dark future perception on risk behaviors was relatively weaker (β = 0.049, SE = 0.009, t = 3.79, p = 0.001, 95% CI [0.021, 0.083]), and although significant, its magnitude was much lower than that reported in the boys' model. Overall, the bootstrap test showed that in both models, moral values played a significant mediating role between the predictor variables (childhood traumatic experiences, psychological status, and dark future perception) and risk behaviors; however, the magnitude of indirect effects was greater in boys than in girls.

Comparison of the girls' and boys' models: The comparison of the two models showed that although the overall pattern of relationships was similar, several major differences existed. First, the effect of psychological status on moral values was much stronger in girls (β = -0.549) than in boys (β = -0.393), indicating that psychological problems lead to a greater decline in moral values among girls. Second, dark future perception had a considerable negative effect on moral values in boys (β = -0.268), whereas this effect was weaker in girls (β = -0.109). Third, regarding direct effects on risk behaviors, psychological status played a more prominent role in girls (β = 0.338) than in boys (β = 0.241), whereas dark future perception showed a stronger effect in boys (β = 0.199) and a weaker effect in girls (β = 0.091). Fourth, in terms of indirect effects, the role of psychological status through moral values was stronger in boys (β = 0.427) than in girls (β = 0.245). In contrast, childhood traumatic experiences had a stronger effect on reducing moral values in girls (β = -0.255) than in boys (β = -0.238).

Figure 1

Model with Standard Coefficients (Boys)

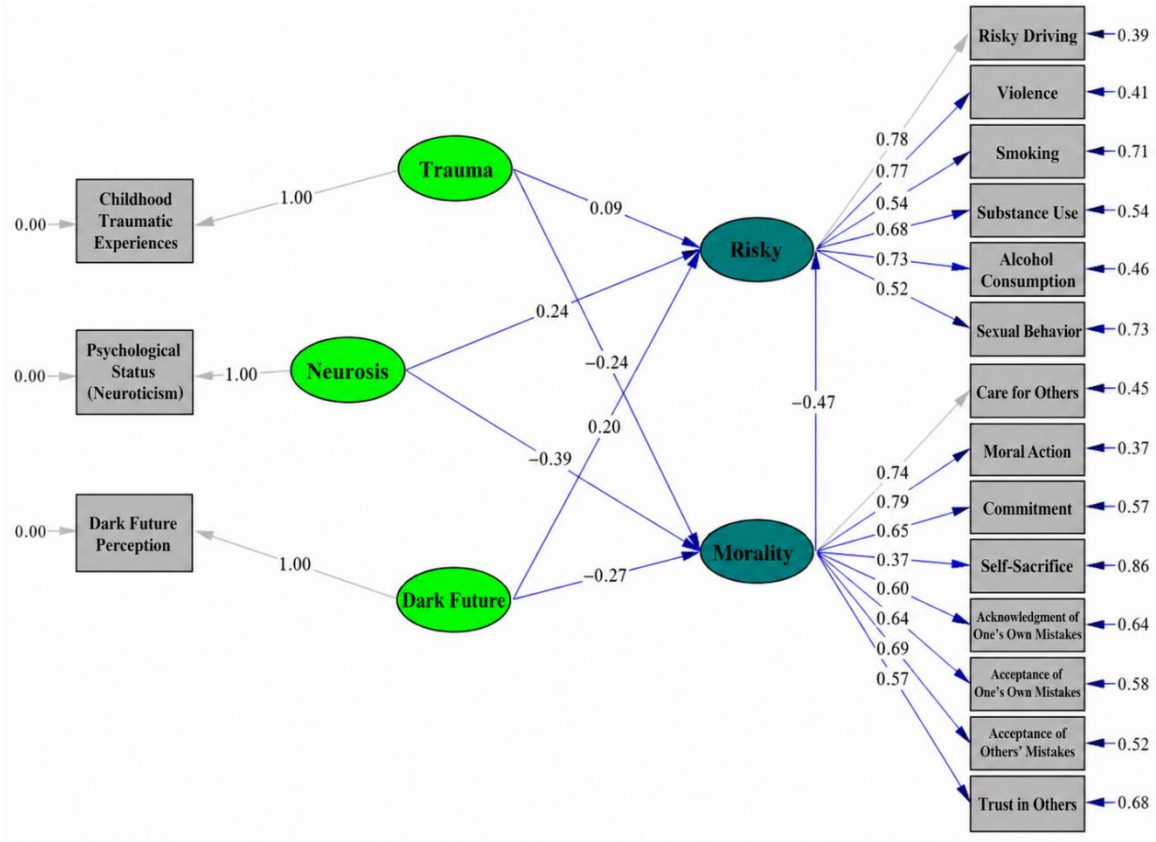

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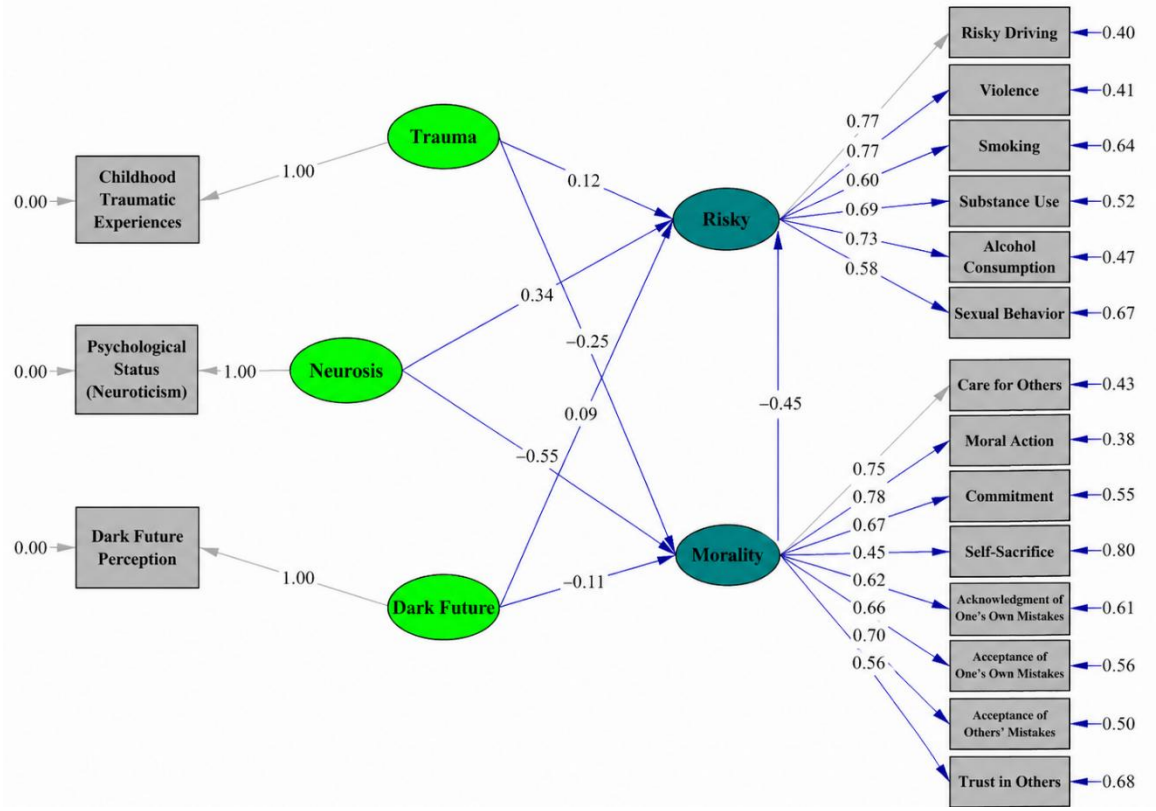
Figure 2

Model with Standard Coefficients (Girls)



4. Discussion and Conclusion

The present study aimed to explain health-related risk behaviors among adolescent girls and boys based on adverse childhood experiences and psychological status through the mediating role of protective moral competencies. The findings demonstrated that the proposed structural model had an acceptable fit in both gender groups and that the relationships among adverse childhood experiences, psychological status, dark future perception, moral competencies, and health-related risk behaviors were statistically significant. Overall, the results indicated that adolescents who reported higher levels of childhood trauma, neuroticism, and dark future perception exhibited greater tendencies toward health-risk behaviors, whereas stronger moral competencies were associated with lower levels of risky behavior. Furthermore, moral competencies played a significant mediating role between the predictor variables and risk behaviors, suggesting that moral functioning constitutes an important protective mechanism in adolescent psychological adjustment.

One of the most important findings of the study was the negative and significant effect of moral competencies on health-related risk behaviors in both girls and boys. Adolescents who demonstrated stronger capacities for empathy, moral commitment, responsibility, trust, and acceptance of mistakes reported lower tendencies toward violence, substance use, risky driving, and other maladaptive behaviors. This finding supports developmental theories emphasizing the protective role of moral functioning in behavioral self-regulation. The result is consistent with the longitudinal findings of Shek and Zhu, who reported reciprocal relationships between moral competence and externalizing behavior among adolescents, indicating that higher moral competence contributes to lower behavioral problems over time (Shek & Zhu, 2019). The findings are also aligned with the work of Athota et al., who showed that moral values contribute to resilience, psychological well-being, and adaptive functioning across different cultural settings (Athota et al., 2020). In addition, positive psychology research has shown that character strengths and ethical capacities promote resilience and self-regulation beyond the effects of self-esteem and social support (Martinez-Marti & Ruch, 2017). Therefore, moral competencies may reduce adolescent risk behaviors by strengthening internalized behavioral standards, increasing

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responsibility toward self and others, and enhancing emotional self-regulation in stressful situations.

Another important finding was the direct positive relationship between adverse childhood experiences and health-related risk behaviors. Adolescents who reported more traumatic childhood experiences exhibited greater involvement in risky behaviors. This finding is theoretically understandable because childhood trauma often disrupts emotional regulation, interpersonal trust, self-worth, and adaptive coping mechanisms. Traumatized adolescents may use risky behaviors as maladaptive coping strategies to regulate emotional distress or seek temporary psychological relief. This result is consistent with systematic evidence indicating that adverse environmental and developmental conditions are strongly associated with adolescent risk-taking behavior (Bozzini et al., 2020). The finding is also supported by Chen et al., who demonstrated that childhood sexual abuse has long-term consequences for risky sexual behavior and maladaptive relational functioning (Chen et al., 2023). Similarly, Haji Seyed Taghiataghavi et al. found that traumatic childhood experiences predict maladaptive psychological outcomes through dysfunctional cognitive-emotional mechanisms (Haji Seyed Taghiataghavi et al., 2021). Research on moral injury has further demonstrated that adverse childhood experiences are associated with disruptions in moral and emotional functioning (Battaglia et al., 2019). Therefore, childhood trauma may increase adolescent risk behavior both directly and indirectly through impairment in psychological and moral development.

The findings also showed that psychological status, particularly neuroticism and emotional vulnerability, had a strong positive effect on health-related risk behaviors and a negative effect on moral competencies. Adolescents with poorer psychological functioning were more likely to engage in risky behaviors and simultaneously demonstrated lower levels of moral competence. This result can be interpreted within emotional dysregulation frameworks. Neurotic adolescents often experience heightened anxiety, emotional instability, impulsivity, and negative affect, which may reduce self-control and increase susceptibility to maladaptive coping strategies. These findings are consistent with research demonstrating that personality traits are important predictors of adolescent health-risk behaviors (Yadav & Misra, 2025). The results also align with Graham et al., who reported that personality characteristics are significantly associated with health-related outcomes and behavioral functioning across the lifespan (Graham et al., 2017). Furthermore, Graham et al. demonstrated that neuroticism is closely related to health behaviors and may contribute to maladaptive behavioral patterns when emotional sensitivity is not balanced by effective self-regulation (Graham et al., 2020). Finch et al. similarly showed that positive psychological resources are associated with better mental health among children and adolescents (Finch et al., 2020). Therefore, adolescents with lower psychological capital and higher neuroticism may have reduced capacity for adaptive coping, thereby increasing vulnerability to risk-taking behavior.

The significant relationship between dark future perception and health-related risk behaviors was another major finding of the study. Adolescents who perceived the future as threatening, uncertain, or hopeless reported higher engagement in risky behaviors. This result is theoretically meaningful because future orientation plays an essential role in adolescent decision-making. When adolescents perceive limited opportunities, instability, or pessimistic future outcomes, immediate gratification may become more psychologically rewarding than long-term self-protection. The findings are consistent with Jackman and MacPhee, who reported that future orientation predicts adolescent risk engagement (Jackman & MacPhee, 2017). The results also support the conceptual framework underlying the Dark Future Scale developed by Zaleski et al., which conceptualizes dark future perception as a cognitive-affective tendency toward anxious and catastrophic future expectations (Zaleski et al., 2019). In the context of adolescence, dark future perception may weaken motivation for healthy behavior, educational commitment, and long-term planning while increasing hopelessness and impulsive coping strategies. This mechanism may become even stronger under conditions of psychological distress or social adversity.

A particularly important contribution of the present study was the demonstration that moral competencies significantly mediated the effects of childhood trauma, psychological status, and dark future perception on risk behaviors. This finding suggests that adverse experiences and emotional vulnerability do not influence risky behavior solely through direct psychological pathways; rather, they also weaken protective moral capacities that normally regulate adolescent behavior. In practical terms, adolescents who experience trauma or emotional distress may gradually lose empathy, responsibility, self-regulation, and commitment to ethical standards, thereby becoming more vulnerable to risky behavioral patterns. This finding extends previous literature by integrating trauma, psychological vulnerability, future

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cognition, and moral functioning into a single explanatory framework. The result is conceptually aligned with research showing that mindful awareness of character strengths contributes to psychological well-being and adaptive functioning (Duan & Ho, 2018). It is also consistent with studies demonstrating that psychological capital and self-control mediate the relationship between environmental adversity and risk-taking behavior (Jia et al., 2021). Therefore, moral competencies may operate as a resilience factor that partially buffers the harmful effects of adversity and psychological vulnerability.

The gender differences observed in the study are also noteworthy. The findings indicated that psychological status had a stronger negative effect on moral competencies and a stronger positive effect on risk behaviors among girls, whereas dark future perception exerted stronger effects among boys. These findings suggest that although the general structural pattern was similar across genders, the intensity of psychological mechanisms differed. Girls appeared more emotionally sensitive to psychological vulnerability, whereas boys appeared more influenced by pessimistic future cognition. These findings are partially consistent with studies indicating gender differences in risk perception and risk-taking behaviors (Reniers et al., 2016). Research on online risky behavior has similarly shown that the mechanisms underlying risk engagement differ between boys and girls (Sasson & Mesch, 2016). Furthermore, road safety research has shown that age and gender interact significantly in predicting risky behavior and accident vulnerability (McCarty & Kim, 2024). These gender differences may reflect variations in socialization, emotional expression, coping strategies, and cultural expectations. Girls may internalize distress more intensely, thereby experiencing stronger emotional effects on moral functioning, whereas boys may respond more strongly to perceptions of uncertainty and future threat.

The findings of the present study also support ecological and developmental perspectives on adolescent behavior. Socioeconomic and environmental adversities likely interact with psychological and moral mechanisms in shaping adolescent risk behaviors. Previous research has demonstrated that socioeconomic risk contributes to cognitive control deficits and emerging risk-taking behavior (Brieant et al., 2020). Similarly, socioeconomic status has been linked to adolescent risk behavior through psychological capital and self-control (Jia et al., 2021), while parenting styles and family conditions have been associated with behavioral problems in children and adolescents (Lin et al., 2023). Research among homeless youth and refugee adolescents further highlights the importance of social vulnerability in the development of risky behavior patterns (Brown et al., 2024; Hirani et al., 2018). Taken together, these findings suggest that adolescent risk behavior is multidetermined and shaped by interactions among developmental trauma, emotional vulnerability, cognitive expectations, moral regulation, and social context.

The findings have important implications for adolescent mental health and prevention science. The strong mediating role of moral competencies suggests that prevention programs should not focus solely on reducing symptoms or controlling behavior. Instead, interventions should strengthen adolescents' moral reasoning, empathy, responsibility, emotional regulation, and future-oriented thinking. Programs that promote resilience, psychological capital, and ethical self-regulation may reduce vulnerability to health-risk behaviors more effectively than approaches focused only on behavioral restriction. Research on psychological interventions among vulnerable youth supports the effectiveness of enhancing psychological resources and adaptive functioning (Rew et al., 2017). In addition, the World Health Organization emphasizes that adolescent health promotion requires integrated strategies addressing psychological, social, and behavioral dimensions simultaneously (World Health, 2021). Therefore, multidimensional school-based and family-based interventions may be particularly effective in reducing adolescent risk behavior and strengthening protective developmental processes.

Another important implication concerns the long-term developmental consequences of adolescent risk behaviors. Risk behaviors established during adolescence may continue into adulthood and contribute to chronic physical, psychological, and social problems. Consequently, identifying mediating protective factors such as moral competencies is essential for early prevention. The present findings suggest that moral development is not only an ethical or educational issue but also a public health issue. Strengthening moral competencies may improve adolescents' capacity for self-regulation, adaptive decision-making, and healthy interpersonal functioning while reducing the behavioral consequences of trauma and psychological distress. This perspective is consistent with contemporary developmental approaches emphasizing resilience, strengths, and preventive mental health promotion rather than focusing exclusively on pathology and behavioral control.

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One limitation of the present study was the use of a cross-sectional design, which limits causal interpretation of the relationships among variables. Another limitation was the reliance on self-report questionnaires, which may have increased the likelihood of response bias, social desirability effects, or inaccurate reporting of sensitive behaviors. In addition, the study was conducted among students from one geographical region, which may reduce the generalizability of the findings to adolescents from other cultural or socioeconomic contexts. Furthermore, some potentially influential variables such as family functioning, peer relationships, parental supervision, and social media exposure were not included in the model.

Future research should employ longitudinal and experimental designs to examine the causal relationships among childhood trauma, psychological vulnerability, moral competencies, and adolescent risk behaviors over time. Researchers are also encouraged to investigate additional mediating and moderating variables such as resilience, attachment styles, emotion regulation, family communication, peer support, and school climate. Comparative studies across different cultural settings and socioeconomic groups may further clarify contextual influences on adolescent risk-taking. It would also be valuable to evaluate the effectiveness of intervention programs designed to strengthen moral competencies and psychological resilience in reducing risky behaviors among adolescents.

From a practical perspective, the findings highlight the importance of implementing school-based and family-based prevention programs focused on strengthening adolescents' moral competencies, emotional regulation, and future orientation. Mental health screening in schools may help identify adolescents with traumatic childhood experiences or psychological vulnerability before risky behaviors become severe. Educational programs aimed at enhancing empathy, responsibility, ethical decision-making, and psychological resilience may contribute to healthier developmental outcomes. Collaboration among psychologists, educators, parents, and health professionals is essential for creating supportive environments that reduce adolescent vulnerability to risk behaviors and promote long-term psychological well-being.

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 study and participated in the research with informed consent. This study was conducted in accordance with ethical standards and received ethical approval under the code IR.IAU.SEMNAN.REC.1403.106.

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