Original Article

Explaining the structural model of the tendency toward substance abuse based on childhood trauma in adolescents: the mediating roles of self-compassion and mentalization

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Abstract

The aim of the present study was to explain a structural model of the tendency toward substance abuse based on childhood trauma in adolescents, mediated by roles of self-compassion and mentalization. The statistical population included all high school students (boys and girls) in the second stage of secondary education in Mashhad city during the 2023-2024 academic year, with 360 students selected as the sample through multi-stage cluster random sampling. To measure the research variables, the Tendency Toward Substance Abuse Scale, the Childhood Trauma Questionnaire, the Reflective Functioning Questionnaire, and the Self-Compassion Scale for Adolescents were used. The research method was descriptive-correlational using structural equation modeling (SEM). Data were analyzed using SPSS25 and AMOS24 software. The findings indicated a significant relationship between childhood trauma and the tendency toward substance abuse, which is mediated by self-compassion, certainty mentalization, and uncertainty mentalization. Based on these results, it is recommended that focusing on improving certainty mentalization capacity and self-compassion in adolescents who have experienced childhood trauma could be an effective approach to prevent substance abuse and promote their mental health.

Introduction

Adolescence is a transitional period from childhood to adulthood, where significant behavioral patterns are formed that can impact an individual's life (Álvarez-García et al., 2019). The challenges during this stage can lead to psychological distress if adolescents fail to navigate developmental crises. This stage is crucial for identity formation, with vulnerability often leading to risky behaviors like substance use (Barahoyi et al., 2023). In Iran, the prevalence of risky behaviors among high school students includes 34.96% for smoking and 31.17% for the use of psychoactive drugs and narcotics (Omidpour et al., 2021). Adolescence is a transitional period from childhood to adulthood, during which significant behavioral patterns that can impact an individual's entire life are formed. The changes during Addiction, or substance abuse, is a global social phenomenon that has affected many societies (Arslan et al., 2024). The high rates of substance abuse and the widespread use of hallucinogens demonstrate the seriousness of the issue. Substance abuse poses a significant threat to many aspects of modern life, including the decreasing age of first use, the emergence of diseases like AIDS, the rise of synthetic substances like ecstasy and crystal meth, and the growing popularity of smoking and opium use among youth (Torkaman et al., 2022). This problem not only endangers public health but also contributes to psychological and moral degradation (Nikmanesh et al., 2015).

In clinical trials, a set of variables have been studied as predictors of the tendency toward substance abuse, among which childhood trauma is significant. It encompasses various forms of abuse, neglect, and domestic violence (Hosseini & Soleimani, 2019). Individuals who experience childhood trauma often develop cognitive vulnerabilities (Lorzanganeh & Issazadegan, 2022) and face challenges with trust,

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attachment, self-esteem, and self-worth (Darroudi et al.). Severe trauma increases impulsivity, reducing the brain's ability to control emotions and actions, which elevates the risk of substance abuse, self-harm, and suicide attempts (Wingenfeld et al., 2017). Many studies highlight the connection between childhood trauma and substance use in adolescence and adulthood adulthood (Nia et al., 2023).

Another important variable with a protective and inhibitory role in the tendency toward substance abuse is self-compassion. It promotes emotional flexibility and helps individuals cope with difficulties (Hupfeld & Ruffieux, 2011). Self-compassion involves kind actions toward oneself during negative events (Neff, 2016). People with a history of psychological pain improve their coping skills and emotional regulation through self-compassion training (Shamsnajafi et al., 2023). Self-compassion is linked to positive change and initiative Baker and McNulty (2011), and increases corrective motivation (Breines & Chen, 2013). For individuals with substance dependence, self-compassion helps resist cravings under stress, both during and after recovery (Tosifian et al., 2017). Positive self-compassion practices, particularly mindfulness, are also associated with reduced substance use over time in individuals with substance use disorders (Arslan et al., 2024).

Finally, another important influencing variable, whose reduced capacity has a role in the tendency toward substance abuse in adolescents, is mentalization. Originally Mentalization linked to borderline personality disorder, it has been applied to issues like eating disorders and drug addiction (Allen et al., 2008). Attachment plays a key role in the development of mentalization, which typically forms in the first few years of life through secure relationships and emotional mirroring (Bateman & Fonagy, 2016). A breakdown in mentalization and weakened ego, often due to insecure attachment or stress, can lead to impulsive behaviors and emotional dysregulation (Springer & Luger-Schuster, 2024). Since emotional dysregulation is central to substance abuse, mentalization is a key predictor of adolescent tendency toward substance abuse.

Recent studies suggest that childhood trauma is a significant predictor of substance use in adulthood (Dawson-Rose, 2023). These traumatic experiences can lead to behavioral and psychological disorders, with substance use often serving as a coping mechanism for emotional pain (Kiefer et al., 2022). Self-compassion has been identified as a protective factor against the negative effects of childhood trauma, helping to reduce psychological issues and risky behaviors (Hupfeld & Ruffieux, 2011). Additionally, mentalization plays a crucial role in treating substance-related disorders by enhancing the ability to understand one's own and others' experiences (Springer & Luger-Schuster, 2024). Despite these findings, there is limited research examining the mediating roles of self-compassion and mentalization in the relationship between childhood trauma and substance use in adolescents. Therefore, the key question of this study is whether self-compassion and mentalization serve as mediating variables between childhood trauma and the tendency toward substance abuse?
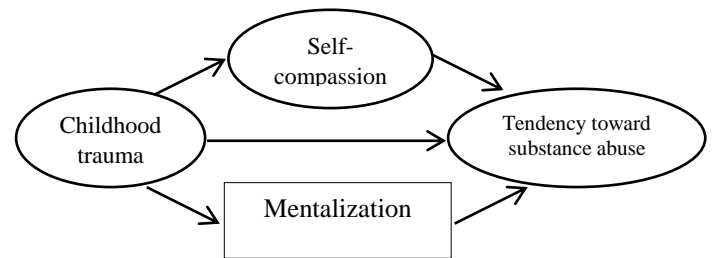

Figure 1. Conceptual model of research

Method

Participants

The statistical population consisted of all girl and boy high school students in Mashhad city during the academic year 2023-2024, aged 15 to 18 years. To determine the sample size, Kline's method (2016) was applied, which recommends a minimum sample size equal to five-fold the number of observed variables (questionnaire items) for SEM studies. Accordingly, a sample of 360 students was selected using a multistage cluster random sampling method from secondary schools in Mashhad city, considering the possibility of sample attrition and ensuring high confidence in the results and better generalizability. The inclusion criteria for participants were an age range of 15 to 18, and the exclusion criteria included incomplete responses or missing data. To adhere to ethical standards, the questionnaires were anonymous, and participation in the survey was voluntary. The research employed a descriptive-correlational design with structural equation modeling. Data analysis was conducted using SPSS 25 and AMOS 24 software.

Instrument

Childhood Trauma Questionnaire:

This scale was designed by Bernstein et al. (2003), to assess childhood trauma and its various dimensions, and it includes 28 questions. The scale is divided into five components: emotional abuse items; physical abuse; sexual abuse; emotional neglect and physical neglect. Items 10, 16, and 22 do not belong to any of the components. The questionnaire uses 5 options, Likert scale ranging from "Never" (1) to "Almost Always" (5). The developers of the questionnaire reported Cronbach's alpha coefficients ranging from 0.81 to 0.95. Concurrent validity with the therapist-rated scale of childhood trauma was found to be between 0.59 and 0.78 (Bernstein, 2003). In Iran, the reliability of the questionnaire was examined, yielding a Cronbach's alpha of 0.86 for the entire scale and between 0.59 and 0.84 for the subscales. Additionally, convergent validity was assessed with the Generalized Anxiety Disorder scale, showing a significant correlation of 0.72 at the 0.01 level (Shafiei et al., 2021). In the present study, Cronbach's alpha for the whole scale and subscales

ranged from 0.78 to 0.89.

Reflective Functioning Questionnaire:

This questionnaire was designed by Fonagy et al (2016), to assess the construct of mentalization. Factor analysis revealed two factors: certainty and uncertainty regarding one's own and others' mental states. The questionnaire consists of 26 items, with questions rated on a 7-point Likert scale from "Strongly Agree" (7) to "Strongly Disagree" (1). Fonagy et al. (2016), reported internal consistency for the certainty and uncertainty components as 0.63 and 0.67, respectively, in non-clinical samples. Additionally, test-retest reliability using a three-week interval was 0.75 for the certainty component and 0.74 for the uncertainty component. The scale was standardized in the Iranian community by Drouger et al (2022), on students. Exploratory factor analysis of this questionnaire identified the two factors of certainty and uncertainty. The confirmatory factor analysis further confirmed the model fit of the 14-item questionnaire, delineating two distinct factors: certainty and uncertainty. Items related to the uncertainty factor were reverse-scored. The convergent validity of this questionnaire was well-supported through correlations with the mindfulness scale, the Adult Attachment Questionnaire, and the anxiety and depression scale. Furthermore, the reliability of the questionnaire, as measured by Cronbach's alpha, was reported as 0.88 for the certainty component and 0.66 for the uncertainty component. In the present study, the Cronbach's alpha reliability was 0.76 for the certainty component and 0.74 for the uncertainty component.

Self-compassion scale for youth:

This scale was made by Neff and et al. (2021) and is used to measure self-compassion in adolescents aged 11 to 18 years. The scale includes 17 items and is divided into six subscales: Self-Kindness, Common Humanity, Mindfulness, Self-Judgment, Isolation, and Over-Identification. The items are scored on a five options Likert scale ranging from 1 (Almost Never) to 5 (Almost Always). In the study by Nazari et al (2022), the adolescent version of the Self-Compassion Scale demonstrated very good internal consistency, with a Cronbach's alpha of 0.88, McDonald's omega of 0.9, composite reliability of 0.87, and test-retest reliability after four weeks of 0.6. The internal consistency of the

questionnaire in this study was measured using Cronbach's alpha for the whole scale and the subscales of mindfulness, common humanity, and self-kindness, resulting in values of 0.80, 0.77, 0.73, and 0.76, respectively.

Tendency Toward Substance Abuse Scale:

This scale was made by Mir Hesami (2009) based on the research by Farjad (2006) to assess the level of tendency towards substance abuse. It consists of 16 items and evaluates three dimensions: Environmental, Individual, and Social. The response options are based on a Likert scale ranging from 1 (Very Low) to 5 (Very High). The Cronbach's alpha of the questionnaire in Mir Hesami's (2009) study with a student sample was reported to be 0.79. In this study, the reliability coefficients of the scale, measured using Cronbach's alpha, were 0.89 for the Environmental subscale, 0.68 for the Individual subscale, and 0.70 for the Social subscale. The Cronbach's alpha coefficient of the questionnaire in this study was 0.71 for the whole scale, and for the subscales of environmental, individual, and social factors, the values were 0.72, 0.72, and 0.79, respectively.

Procedure

The study obtained necessary permissions and selected District 2 of Mashhad city for the research. Six secondary schools were randomly chosen from a list of 20, and 14 classes were selected, each with 25-30 students. Ethical standards were maintained by holding a meeting with parents and students to explain the research objectives before distributing questionnaires via the Shad platform. Participants were assured of confidentiality. Data analysis was conducted using SPSS25 and AMOS24, employing correlation analysis and structural equation modeling techniques.

Results

The descriptive findings of the demographic information from the sample group indicate that the participants' average age was 16.77, with a standard deviation of 1.05, within the 15-18 age range. Among the participants, 183 (50.8%) were female, and 177 (49.2%) were male. Additionally, 32.8% of the students were in the 10th grade, 33.3% in the 11th grade, and 33.9% in the 12th grade. In terms of academic fields, 34.2% of the students were in mathematics, 31.4% in humanities, and 34.4% in experimental sciences.

Table 1. Descriptive Statistics of Research Variables

Component	Mean	SD	Min	Max	Skewness	Kurtosis
Childhood Trauma	54.43	23.57	30	120	1.54	.80
Emotional Abuse	10.76	5.22	5	25	1.32	.55
Physical Abuse	11.01	5.12	5	25	1.24	.38
Sexual Abuse	11.14	4.50	5	25	1.03	.33
Emotional Neglect	10.50	5.45	5	25	1.48	.85
Physical Neglect	11.03	4.94	5	25	1.31	.64
certainty Mentalization	46.01	12.51	11	63	-1.48	.79
Uncertainty Mentalization	14.13	7.26	5	33	1.26	.40

Self-Compassion	63.53	16.20	18	83	-1.37	.51
Mindfulness	22.62	6.28	6	30	-1.25	.24
Common humanity	22.64	5.89	7	30	-1.30	.39
Self-kindness	18.26	4.77	5	25	-1.08	.21
Tendency toward substance abuse	35.66	14.88	17	80	1.47	.85
Family	10.90	5.19	5	25	1.31	.63
Individual	8.59	4.13	4	20	1.29	.56
Social	16.16	6.49	8	35	1.22	.48

The mean, standard deviation, minimum, and maximum scores of the participants for the research variables are presented in Table 1.

Table 2. Pearson correlation matrix between research variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.Childhood Trauma	1															
2.Emotional Abuse	.46**	1														
3.Physical Abuse	.42**	.60**	1													
4.Sexual Abuse	.40**	.58**	.38**	1												
5.Emotional Neglect	.45**	.50**	.41**	.39**	1											
6.Physical Neglect	.42**	.61**	.48**	.36**	.37**	1										
7.certainty Mentalization	-.33**	-.30**	-.22**	-.25**	-.19*	-.17*	1									
8.Uncertainty Mentalization	.38**	.34**	.17*	.29**	.15*	.19*	-.34**	1								
9.Self-Compassion	-.35**	-.26**	-.25**	-.28**	-.35**	-.27**	.21**	-.26**	1							
10.Mindfulness	-.31**	-.21**	-.22**	-.25**	-.32**	-.24**	.17*	-.24**	.35**	1						
11.Common humanity	-.35**	-.23**	-.19*	-.23**	-.33**	-.26**	.19*	-.22**	.22**	.37**	1					
12.Self-kindness	-.29**	-.24**	-.24**	-.26**	-.31**	-.25**	.21**	-.23**	.28**	.23**	.29**	1				
13. Tendency toward substance abuse	.38**	.41**	.33**	.30**	.29**	.31**	-.24**	.18*	-.44**	-.35**	-.28**	-.23**	1			
14.Family	.28**	.22**	.29**	.28**	.26**	.28**	-.22**	.15*	-.43**	-.29**	-.20**	-.21**	.33**	1		
15.Individual	.35**	.37**	.31**	.26**	.28**	.30**	-.21**	.13*	-.41**	-.23**	-.26**	-.22**	.35**	.28**	1	
16.Social	.34**	.31**	.32**	.29**	.27**	.29**	-.23**	.17*	-.42**	-.34**	-.24**	-.21**	.39**	.27**	.32**	1

**P<.001

Table 2 presents the results of the Pearson correlation coefficient. According to this table, Childhood Trauma has a significant positive correlation with Uncertainty Mentalization and Tendency toward substance Abuse, and a significant negative correlation with Certainty Mentalization and Self-Compassion. Additionally, Certainty Mentalization and Self-Compassion have a significant negative correlation with Tendency toward substance Abuse, while Uncertainty Mentalization has a significant positive correlation with Tendency toward substance abuse.

In this study, before applying the Structural Equation Modeling (SEM) approach, the statistical assumptions were examined. First, univariate normality was confirmed by evaluating skewness and kurtosis values, which fell within the ±2 range. Next, multivariate normality was assessed using the Mardia's skewness

coefficient and critical ratio, with values obtained (4.186 for Mardia's skewness and 1.113 for the critical ratio) being less than the critical value of 5, confirming the assumption. Multivariate outliers were examined using the Mahalanobis distance index, and no outliers were detected.

Furthermore, autocorrelation in the errors was assessed using the Durbin-Watson statistic, yielding a value of 1.92, indicating that this assumption was satisfied. Collinearity among the exogenous variables was evaluated using tolerance and variance inflation factor (VIF), with values indicating that multicollinearity was not a concern. Based on these results, the use of Structural Equation Modeling with the Maximum Likelihood method was deemed appropriate for evaluating model fit.

Table 3. Fit indices related to the research model

indices	χ^2/df	RMSEA	AGFI	CFI	PCLOSE	IFI	GFI	NFI
acceptable	<3	<.08	>.9	>.9	>.05	>.9	>.9	>.9
Observed range	2.24	.06	.94	.96	.09	.96	.93	.96

Table 3 presents the model fit indices for the research model. The results in Table 3 indicate that, based on the criteria set by Hu and Bentler (1999), the model demonstrates a good fit.

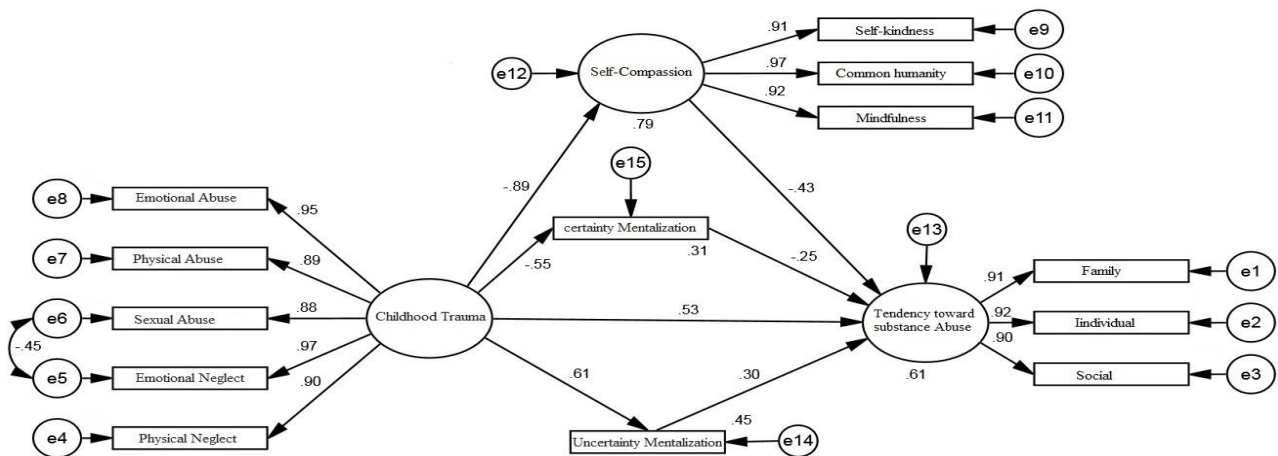**Figure 2.** Proposed Research Model

Figure 2 illustrates the standardized coefficients for the pathways in the conceptual model are presented.

Table 4. Standardized Coefficients of Direct Pathways in the Research Model

Predictive variables	direct	T-value	S.E	p
Childhood Trauma---> Tendency toward substance abuse	.53	5.34	.11	<.001
Childhood Trauma---> certainty Mentalization	-.55	-12.41	.08	<.001
Childhood Trauma---> Self-Compassion	-.89	-21.94	.05	<.001
Certainty Mentalization ---> Tendency toward substance abuse	-.25	-3.78	.13	<.001
Uncertainty Mentalization ---> Tendency toward substance abuse	.30	4.22	.12	<.001
Self-Compassion ---> Tendency toward substance abuse	-.43	-9.18	.04	<.001
Childhood Trauma---> Uncertainty Mentalization	.61	19.78	.07	<.001

Table 4 presents the direct effects between the research variables. As shown in the table, Childhood Trauma has a significant positive effect on Tendency toward substance Abuse (Beta = 0.53, P < 0.001) and Uncertainty Mentalization (Beta = 0.61, P < 0.001), and a significant negative effect on Certainty Mentalization (Beta = -0.55, P < 0.001) and Self-Compassion (Beta = -0.89, P < 0.001).

Table 5. Indirect coefficients of research model paths

path	Indirect	S.E	lower	upper	p
Childhood Trauma---> certainty Mentalization---> Tendency toward substance abuse	.14	.06	.08	.23	<.001
Childhood Trauma---> Uncertainty Mentalization ---> Tendency toward substance abuse	.19	.09	.14	.26	<.001
Childhood Trauma---> Self-Compassion ---> Tendency toward substance abuse	.39	.10	.31	.45	<.001

Furthermore, to test the mediating role of Self-Compassion and Mentalization in the relationship between Childhood Trauma and Tendency toward substance abuse, a bootstrap test with 2000 samples was conducted. The results in Table 5 indicate that the indirect effect of Childhood Trauma on Tendency toward substance Abuse through Self-Compassion and Mentalization is significant. Therefore, Childhood Trauma influences adolescents' Tendency toward substance Abuse not only directly but also indirectly through Self-Compassion and Mentalization.

Additionally, Childhood Trauma, Self-Compassion, and Mentalization together account for 61% of the variance in Tendency toward substance abuse.

Discussion

The present study aimed to explain the structural model of the tendency toward substance abuse based on childhood trauma in adolescents, mediated by mentalization and self-compassion in adolescents. In this study, both direct and indirect relationships between the variables were tested, and as observed in the findings, the proposed model showed a satisfactory fit.

The first finding of the research indicated that childhood trauma, in addition to its direct effect, also has an indirect relationship with tendency toward substance abuse through the mediation of mentalization. While this finding aligns with some previous research, such as those by Nia et al. (2023), Kiefer et al. (2022), and Moradzadeh & Najafi (2022), no studies were found that specifically examined the indirect effects of these variables. Evidence indicates a relationship between dimensions of childhood trauma (emotional and physical neglect, physical, sexual, and emotional abuse) and substance abuse. In explaining this finding, it can be said that traumatic experiences during childhood,

especially with caregivers, create an environment that invalidates the child's emotions and feelings. In such an insecure space, the child may adopt maladaptive strategies such as suppression or avoidance of negative emotions, which could lead to substance abuse in adulthood (Lotzin et al., 2019).The other hand, this finding indicates that mentalization acts as a mediator in the relationship between childhood trauma and the tendency toward substance abuse. Another explanation for this finding can be based on evidence from attachment theory. Recent views on attachment in the context of substance abuse and its connection with attachment disorders emphasize the crucial impact of early relational bonds on individual psychological development, considering trauma and injury during childhood (Southgate, 2016). Indeed, adolescents with severe trauma often experience anxiety and depression due to low mentalization, which can lead to substance use as self-medication. Additionally, childhood trauma combined with high mentalization related to uncertainty can cause behavioral issues like aggression and social problems, pushing adolescents into high-risk situations and increasing their likelihood of substance abuse.

Another part of the research findings indicated a significant negative correlation between certainty mentalization and the tendency toward substance use. Additionally, there was a significant positive correlation between uncertainty mentalization and the tendency toward substance use. These findings align with the research of Zorani & Peles (2024), and Azad et al. (2024). The results are consistent with previous studies, demonstrating that in adolescents, the ability to mentalize can significantly influence behaviors related to mental health and risky behaviors, including substance abuse. Adolescents with mentalization difficulties often turn to substance use due to their inability to manage stress, accurately understand the beliefs, thoughts, and feelings of themselves and others, and use substances as a way to escape negative emotions or cope with anxiety.

The results also indicate a significant negative relationship between self-compassion and the tendency toward substance abuse, which is consistent with the findings of Arslan et al. (2024), and Rahmati et al. (2021). This finding can be explained by the fact that characteristics of self-compassion, such as kindness toward oneself, mindfulness, and the absence of self-blame and criticism, enhance resilience in adolescents. This increased resilience enables them to better resist the temptation to substances abuse (Rahmati et al., 2021). In other words, self-compassion, as a supportive and positive approach, can protect an individual from the negative effects of harsh self-judgment, social withdrawal, and mental health issues (Neff, 2016). Adolescents who practice self-kindness are less likely to engage in unhealthy behaviors like substance abuse during stress or failure. Self-kindness promotes healthier coping mechanisms, while mindfulness helps prevent automatic, unhealthy reactions by fostering awareness and acceptance of thoughts and feelings.

The study's final finding found that self-compassion mediates the link between childhood trauma and tendency toward substance abuse. Childhood trauma can negatively impact emotional and psychological development, often leading individuals to use substances to escape emotional pain. However, self-compassion helps mitigate these effects by promoting self-acceptance, reducing emotional pressures, and fostering inner security, ultimately decreasing the likelihood of substance abuse.

Conclusion

This study aimed to examine the impact of childhood trauma on the tendency toward substance abuse in adolescents, along with the mediating role of mentalization and self-compassion. The findings revealed valuable insights, indicating that childhood trauma can directly and indirectly contribute to substance abuse tendencies by reducing the capacities for mentalization and self-compassion. These protective factors enhance adolescents' ability to manage emotions and stress, helping mitigate the negative effects of childhood trauma. Therapeutic and psychological interventions aimed at strengthening these skills could be implemented as both preventive and remedial strategies to reduce the tendency toward substance abuse in adolescents. One limitation of this study is that the findings cannot be used to draw causal conclusions. To support the findings, longitudinal studies are recommended to provide more comprehensive information. Additionally, the use of self-reported questionnaires posed a limitation in the current study, and it is suggested that future research utilize other tools, such as interviews and qualitative methods, to minimize response bias and achieve more accurate results.

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The authors declare that there is no conflict of interest regarding the publication of this paper.

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