



CLINICAL RESEARCH ARTICLE



The mediating roles of stressful life events and negative affect in the relationship between childhood maltreatment and non-suicidal self-injury among clinical adolescents

Juan He ^{a,b,*}, Zengyu Chen^{c*}, Yidong Shen^d, Yusheng Tian^d, Yamin Li ^a and Jianjun Ou ^d

^aHunan Provincial People's Hospital (The First Affiliated Hospital of Hunan Normal University), Changsha, People's Republic of China;

^bXiangya School of Nursing, Central South University, Changsha, People's Republic of China; ^cSchool of Nursing, University of Washington-Seattle, Seattle, WA, USA; ^dDepartment of Psychiatry, National Clinical Research Center for Mental Disorders, The Second Xiangya Hospital of Central South University, Changsha, People's Republic of China

ABSTRACT

Background: Non-suicidal self-injury (NSSI) is a significant public health concern among adolescents, particularly in psychiatric settings, where prevalence rates exceed those observed in the general community. Childhood maltreatment (CM) is a known risk factor for NSSI; however, the mechanisms linking CM to NSSI are not fully understood.

Objective: This study explored the mediating roles of stressful life events (SLEs) and negative affect (depression and anxiety) in the relationship between CM and NSSI, grounded in the cumulative adversity theory.

Methods: In this cross-sectional survey, 226 Chinese adolescents (Mage = 14.76, SD = 1.70) admitted to a psychiatric unit participated. Measures included the Childhood Trauma Questionnaire (CTQ-SF), the Adolescent Self-Rating Life Events Checklist (ASLEC), the Patient Health Questionnaire-9 (PHQ-9), the Generalized Anxiety Disorder-7 (GAD-7), and the Ottawa Self-Injury Inventory Chinese Revised Edition (OSIC). Structural equation modelling (SEM) was used to analyze mediation pathways.

Results: Stressful life events and negative affect fully mediated the relationship between childhood maltreatment and NSSI. Specifically, CM indirectly influenced NSSI severity through increased negative affect ($\beta = 0.088$, 95% CI: 0.014–0.186, $p = .039$) and through a sequential pathway involving both SLEs and negative affect ($\beta = 0.137$, 95% CI: 0.072–0.251, $p = .002$). However, the pathway from CM to NSSI via SLEs alone was not significant ($\beta = -0.053$, 95% CI: -0.267 to 0.093, $p = .565$).

Conclusion: The findings align with cumulative adversity theory, suggesting that childhood maltreatment elevates NSSI risk by increasing emotional distress in response to subsequent stressful life events. Targeted interventions should focus on helping at-risk adolescents manage stress and strengthen emotional resilience.

Los roles mediadores de los eventos vitales estresantes y del afecto negativo en la relación entre el maltrato infantil y la autolesión no suicida en adolescentes clínicos

Antecedentes: La autolesión no suicida (ANS) representa una preocupación importante de salud pública entre los adolescentes, particularmente en contextos psiquiátricos, donde las tasas de prevalencia superan a las observadas en la población general. El maltrato infantil (MI) es un factor de riesgo conocido para la ANS; sin embargo, los mecanismos que vinculan el MI con la ANS aún no se comprenden completamente.

Objetivos: Este estudio examinó los roles mediadores de los eventos vitales estresantes (SLEs, según sus siglas e inglés) y del afecto negativo (depresión y ansiedad) en la relación entre el MI y la ANS, basándose en la teoría de la adversidad acumulativa.

Métodos: En esta encuesta de corte transversal participaron 226 adolescentes chinos (Edad media = 14.76; DE = 1.70) ingresados en una unidad de psiquiatría. Los instrumentos utilizados incluyeron el Cuestionario de Trauma Infantil (CTQ-SF por sus siglas en inglés), la Adolescent Self-Rating Life Events Checklist (ASLEC), el Cuestionario sobre la Salud del Paciente-9 (PHQ-9), el Cuestionario de Trastorno de Ansiedad Generalizada-7 (GAD-7) y el Inventario de Autolesiones de Ottawa, Edición Revisada en chino (OSIC). Se utilizó modelamiento de ecuaciones estructurales (SEM, según siglas en inglés) para analizar las vías de mediación.

Resultados: Los eventos vitales estresantes y el afecto negativo mediaron completamente la relación entre el maltrato infantil y la ANS. Específicamente, el MI influyó indirectamente en la

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Adolescente; ansiedad; depresión; autolesión no suicida; maltrato infantil; evento vital estresante

HIGHLIGHTS

- This study is the first to examine the mediating roles of stressful life events and negative affect in the relationship between childhood maltreatment and non-suicidal self-injury using a serial mediation model in a clinical adolescent sample.
- Findings align with cumulative adversity theory, suggesting that childhood maltreatment elevates NSSI risk by increasing emotional distress in response to subsequent stressful life events.
- Findings highlight the need for targeted interventions that manage life stressors and enhance emotional resilience to prevent and reduce self-injurious behaviours in high-risk adolescents.

CONTACT Yamin Li  amin5433@163.com  Hunan Provincial People's Hospital (The First Affiliated Hospital of Hunan Normal University), Changsha, Hunan 410005, People's Republic of China; Jianjun Ou  oujianjun@csu.edu.cn  Department of Psychiatry, National Clinical Research Center for Mental Disorders, The Second Xiangya Hospital of Central South University, Changsha, Hunan 410011, People's Republic of China

*These authors contributed equally as co-first authors.

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gravedad de la ANS a través del aumento del afecto negativo ($\beta = 0.088$; IC 95%: 0.014 a 0.186; $p = .039$) y mediante una vía secuencial que involucró tanto SLEs como el afecto negativo ($\beta = 0.137$; IC 95%: 0.072 a 0.251; $p = .002$). Sin embargo, la vía desde el MI hacia la ANS a través únicamente de los SLEs no fue estadísticamente significativa ($\beta = -0.053$; IC 95%: -0.267 a 0.093 ; $p = .565$).

Conclusiones: Los hallazgos son consistentes con la teoría de la adversidad acumulativa, lo que sugiere que el maltrato infantil incrementa el riesgo de ANS al intensificar el malestar emocional frente a eventos vitales estresantes posteriores. Las intervenciones dirigidas deberían centrarse en ayudar a los adolescentes en riesgo a manejar el estrés y fortalecer su resiliencia emocional.

1. Introduction

Non-suicidal self-injury (NSSI) is defined as intentional, self-inflicted damage to the body surface without suicidal intent, which is not socially sanctioned (Brown & Plener, 2017). NSSI is most prevalent during adolescence, with a global lifetime prevalence of approximately 22% for at least one incidence of NSSI (Lim et al., 2019; Xiao et al., 2022). In clinical adolescent samples, this prevalence is significantly higher, ranging from 40% to 78.3% depending on the specific psychiatric condition (Sun et al., 2023; Zhong et al., 2024). Approximately 20% of adolescents who repeatedly engage in NSSI persist for over five years, indicating a chronic and severe clinical trajectory (Wilkinson, 2013). Given the serious health risks, including increased suicide risk and social dysfunction associated with NSSI (Iskric et al., 2020; McManus et al., 2019), identifying modifiable risk factors and underlying mechanisms is crucial for developing targeted interventions.

Childhood maltreatment (CM), defined as intentional harm or neglect by a caregiver, is a robust predictor of NSSI, encompassing emotional, physical, sexual abuse, and neglect (Calvo et al., 2024; Liu et al., 2018). CM significantly increases vulnerability to emotional distress, interpersonal problems, and maladaptive coping strategies, all of which heighten the risk for NSSI (Brown & Plener, 2017). Previous research highlighted stressful life events (SLEs), such as academic stress, peer conflicts, and family dysfunction, as potential mechanisms mediating the relationship between CM and NSSI. Adolescents experiencing CM often face subsequent severe and frequent life stressors, exacerbating emotional vulnerability and NSSI risk (Gao et al., 2020; Yang et al., 2022).

Negative affect refers to negative emotions or moods experienced by individuals, such as depression, anger, anxiety, fear, and hatred (Lin et al., 2023). Among these, depression and anxiety are two of the most common and clinically relevant in adolescent populations (Jiang et al., 2022). Adolescents who experience maltreatment often struggle with overwhelming negative affect and poor coping mechanisms, leading to emotion dysregulation and increased likelihood of NSSI (Wei et al., 2022). These findings

suggest that negative affect, captured through depressive and anxiety symptoms, may serve as a key psychological mechanism mediating the association between CM and NSSI.

Although CM, SLEs, and negative affect have individually been identified as risk factors, previous research has not integrated these mediators within a unified framework, particularly within clinical adolescent samples, who often exhibit more severe NSSI (Gao et al., 2020; Hu et al., 2023; Wei et al., 2022). The cumulative adversity theory suggests that multiple stressors compound psychological outcomes, highlighting the need to examine these mediators concurrently (Turner & Colburn, 2022). To our knowledge, no study has identified the mediating pathways of SLEs and negative affect from CM to NSSI through a serial mediation model, particularly in clinical adolescent samples. To address these gaps, this study aims to employ a serial mediation model to clarify the indirect pathways from CM to NSSI through SLEs and negative affect (depression and anxiety). Specifically, we hypothesize: (H1) SLEs mediate the relationship between CM and NSSI; (H2) negative affect mediates the relationship between CM and NSSI; and (H3) SLEs and negative affect sequentially mediate the CM-NSSI relationship.

2. Methods

2.1. Participants

This cross-sectional study was conducted at the Second Xiangya Hospital between September 2024 and January 2025. Adolescents aged 10–19 years who were admitted to the psychiatry unit were considered eligible for participation. Admission was based on significant functional impairment, safety concerns such as self-injury, or inadequate response to outpatient treatment. The inclusion criterion was current moderate-to-severe emotional or behavioural symptoms necessitating inpatient psychiatric care. Individuals were excluded if they had a current or previous diagnosis of schizophrenia spectrum disorders, intellectual disability, or significant cognitive impairment likely to impact their ability to complete assessments.

Participant selection and diagnostic assessments were performed by two licenced clinical psychiatrists. Each psychiatrist independently reviewed medical records, collected psychiatric histories, and administered the Structured Clinical Interview for DSM-5 (SCID-5) to confirm psychiatric diagnoses. All assessments were conducted in accordance with DSM-5 diagnostic criteria, and any discrepancies were resolved through discussion and consensus.

A total of 234 adolescents were initially recruited, including 58 males (24.79%) and 176 females (75.21%). Eight participants were excluded prior to analysis: five due to incomplete assessments and three based on data quality control procedures. These procedures involved identifying implausible values (e.g. scoring near zero on either the PHQ-9 or GAD-7 while reporting clinically significant symptoms during SCID-5 interviews) or detecting logical inconsistencies (e.g. reporting daily self-injury in the past month while indicating no lifetime history of self-injury). Following these exclusions, the final analytic sample comprised 226 participants. The primary psychiatric diagnoses were depressive disorders (67.26%) and bipolar disorders (27.43%). Other diagnoses included anxiety disorders, obsessive-compulsive disorder, somatic symptom disorders, and neurodevelopmental disorders.

Ethical approval for this study was obtained from an institutional ethics committee. Written informed consent was obtained from all participants and their guardians after they were informed of the study's purpose and procedures.

2.2. Measures

2.2.1. Demographic questionnaire

A self-designed questionnaire was used to collect demographic information from participants, including sex, age, and years of education.

2.2.2. Childhood maltreatment

The Chinese version of Childhood Trauma Questionnaire-Short Form (CTQ-SF) was used to assess the severity of childhood maltreatment (Bernstein et al., 1994, 2003; Zhao et al., 2005). The CTQ-SF consists of 25 clinical items and 3 validity items. The clinical items are categorized into five subscales: emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), and physical neglect (PN). Each item is rated on a five-point scale, with higher scores indicating greater maltreatment experiences in early life. Subscale scores range from 5 to 25, and the total score is the sum of all 25 clinical items (Fang et al., 2023). A previous study demonstrated that the Chinese version of the CTQ-SF has good reliability in measuring childhood maltreatment among adolescents, with a Cronbach's α of 0.770 for

the full scale and subscale values ranging from 0.506 to 0.835 (Wu et al., 2023). In the present study, the Cronbach's α coefficient was 0.883 for the full scale, with subscale values ranging from 0.592 to 0.900.

2.2.3. Stressful life events

The Adolescent Self-Rating Life Events Checklist (ASLEC), originally developed in Chinese, was used to assess stressful life events experienced by participants in the past 12 months (Liu et al., 1997). The ASLEC has been widely applied among Chinese adolescent populations (Jiang et al., 2022; Wu et al., 2023). The ASLEC consists of 27 events that may negatively impact adolescents and is categorized into six domains: interpersonal relationships, academic pressure, punishment, loss, health adjustment, and others. Each event is rated on a five-point scale: (1) indicates that the event did not occur or had no impact; (2) a mild impact; (3) a moderate impact; (4) a severe impact; and (5) an extremely severe impact (Zou et al., 2022). The Cronbach's α for the ASLEC was reported as 0.92, with factor reliability values ranging from 0.53 to 0.89 (Liu et al., 1997). In the present study, the Cronbach's α was 0.916, with subscale values ranging from 0.522 to 0.824.

2.2.4. Negative affect

In this study, negative affect was operationalized as a latent construct represented by two validated symptom-based measures: the Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms and the Generalized Anxiety Disorder-7 (GAD-7) for anxiety symptoms. This approach has been adopted in previous research to indicate the negative affective status of individuals (Lin et al., 2023).

The Patient Health Questionnaire-9 (PHQ-9) was used to measure depression levels over the past two weeks (Kroenke et al., 2001). This nine-item scale rates each item on a four-point scale from 0 ('not at all') to 3 ('nearly every day'), with total scores ranging from 0 to 27. Higher scores indicate greater depression severity. The Chinese version of the PHQ-9 has demonstrated high reliability in previous studies, with a Cronbach's α of 0.86 (Wang et al., 2014). In this study, the Cronbach's α was 0.892.

The Generalized Anxiety Disorder-7 (GAD-7) was used to assess anxiety levels over the past two weeks (Spitzer et al., 2006). This seven-item scale also employs a four-point scoring system from 0 ('not at all') to 3 ('nearly every day'), with higher scores reflecting greater anxiety severity. The Chinese version of the GAD-7 has been validated as a reliable assessment tool, with Cronbach's α ranging from 0.93 to 0.95 (Sun et al., 2021). In this study, the Cronbach's α was 0.916.

2.2.5. Non-suicidal self-injury

The occurrence of NSSI and its frequency were assessed using the Ottawa Self-Injury Inventory Chinese Revised Edition (OSIC). The OSIC is a concise, efficient tool for clinically and scientifically investigating the NSSI behaviours among Chinese adolescents (Peng et al., 2023). In this study, the first OSIC question, ‘Have you ever engaged in non-suicidal self-injury?’ was used to determine whether participants had a history of NSSI. The second question, ‘How many times have you self-injured in the past month?’ was used to measure NSSI frequency over the past month. NSSI frequency was categorized into four levels: 0 (no NSSI in the past month), 1 (at least once), 2 (weekly), and 3 (daily). Higher frequency levels indicate more severe NSSI behaviour.

2.3. Statistical analyses

Descriptive statistics and correlation analyses of the study variables were conducted using SPSS version 27.0. Depending on the data distribution, either Pearson’s or Spearman’s rank correlation was used to

examine the associations between the study variables. Prior to conducting structural equation modelling (SEM), all continuous variables were standardized as z-scores using SPSS to ensure that all variables were on the same scale. SEM was performed using Mplus version 8.3 to evaluate the mediating effects of stressful life events and negative affect in the relationship between childhood maltreatment and NSSI. The model included all relevant variables and controlled for sex and age as covariates. Robust maximum likelihood estimation (MLR) was used for model fitting to account for potential non-normality (Muthén et al., 2017). Five indices were employed to assess model fit: (a) the χ^2/df ratio (≤ 2); (b) the root mean square error of approximation (RMSEA, < 0.08); (c) comparative fit index (CFI, ≥ 0.90); (d) Tucker–Lewis index (TLI, ≥ 0.90), and (e) the standardized root mean squared residual (SRMR, ≤ 0.08) (Meyers et al., 2016; West et al., 2012). To determine the significance of indirect effects, bootstrapping was conducted with 5,000 resamples. During bootstrapping, maximum likelihood (ML) estimation was applied to calculate bias-corrected 95% confidence intervals (CIs). Indirect effects were considered significant if the 95% CI did not include zero.

Table 1. Demographic and clinical characteristics of the study participants ($N = 226$).

Variable	Mean (SD)/ n (%)
Age (years), M (SD)	14.76 (1.70)
Sex	
Male, n (%)	56 (24.78)
Female, n (%)	170 (75.22)
Education (years), M (SD)	8.43 (1.75)
Diagnosis	
Depressive disorders, n (%)	152 (67.26)
Bipolar and related disorders, n (%)	62 (27.43)
Anxiety disorders, n (%)	2 (0.88)
Obsessive compulsive disorders, n (%)	5 (2.21)
Somatic Symptom and Related Disorders, n (%)	2 (0.88)
Neurodevelopmental Disorders, n (%)	3 (1.33)
Childhood maltreatment	
EA, M (SD)	12.65 (5.12)
PA, M (SD)	7.62 (3.77)
SA, M (SD)	6.24 (2.84)
EN, M (SD)	17.44 (5.23)
PN, M (SD)	9.57 (3.27)
Stressful life events	
Interpersonal relationship, M (SD)	10.46 (5.11)
Academic pressure, M (SD)	9.17 (4.72)
Punishment, M (SD)	8.12 (5.45)
Loss, M (SD)	2.12 (2.81)
Health adjustment, M (SD)	5.71 (3.38)
Others, M (SD)	5.70 (3.20)
Negative affect	
Depression, M (SD) ^a	17.80 (6.40)
Anxiety, M (SD) ^b	13.15 (5.70)
History of NSSI	
No, n (%)	31 (13.72)
Yes, n (%)	195 (86.28)
NSSI frequency	
0 = none, n (%)	60 (26.55)
1 = at least once, n (%)	74 (32.74)
2 = weekly, n (%)	62 (27.43)
3 = daily, n (%)	30 (13.27)

M : mean; SD : standard deviation; PA: physical abuse; EA: emotional abuse; SA: sexual abuse; EN: emotional neglect; PN: physical neglect; NSSI: non-suicidal self-injury.

^aMeasured with the Patient Health Questionnaire-9 (PHQ-9).

^bMeasured with the Generalized Anxiety Disorder-7 (GAD-7).

3. Results

3.1. Descriptive statistics

Table 1 summarizes the demographic and clinical characteristics of participants. The sample consisted of 226 adolescents (56 males and 170 females), with a mean age of 14.76 years ($SD = 1.70$). Among these, 195 adolescents (86.28%) reported a history of NSSI, and 166 (74.45%) reported engaging in NSSI within the past month. Approximately two-thirds (67.26%) had a diagnosis of depressive disorders, and roughly one-quarter (27.43%) were diagnosed with bipolar and related disorders. Regarding childhood maltreatment, emotional neglect had the highest mean score (17.44), followed by emotional abuse (12.65), physical neglect (9.57), and physical abuse (7.62); sexual abuse had the lowest mean score (6.24). Among stressful life events, interpersonal relationship stressors showed the highest mean score (10.46), whereas loss events had the lowest (2.12).

3.2. Correlation analyses

Table 2 presents the correlation matrix of the study variables. All types of childhood maltreatment were significantly correlated with NSSI frequency, with coefficients ranging from 0.131 to 0.353 ($p < .05$ or $p < .01$). Two types of childhood maltreatment, EA and PN, were significantly correlated with the postulated mediators, SLEs and negative affect. No

Table 2. Correlations between study variables ($N = 226$).

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. NSSI	1															
2. EA	0.353**	1														
3. PA	0.131*	0.594**	1													
4. SA	0.184**	0.201**	0.221**	1												
5. EN	0.312**	0.456**	0.324**	0.018	1											
6. PN	0.225**	0.441**	0.395**	0.207**	0.540**	1										
7. Interpersonal relationship	0.283**	0.611**	0.370**	0.256**	0.283**	0.342**	1									
8. Academic pressure	0.252**	0.436**	0.263**	0.061	0.235**	0.253**	0.620**	1								
9. Punishment	0.202**	0.580**	0.432**	0.180**	0.295**	0.343**	0.691**	0.665**	1							
10. Loss	0.07	0.307**	0.296**	0.228**	0.076	0.145*	0.458**	0.404**	0.529**	1						
11. Health adjustment	0.314**	0.504**	0.305**	0.213**	0.213**	0.300**	0.616**	0.598**	0.683**	0.532**	1					
12. Others	0.320**	0.586**	0.329**	0.180**	0.276**	0.285**	0.605**	0.417**	0.633**	0.300**	0.565**	1				
13. Depression	0.480**	0.492**	0.155*	0.059	0.277**	0.315**	0.497**	0.473**	0.417**	0.201**	0.530**	0.480**	1			
14. Anxiety	0.323**	0.375**	0.069	0.121	0.153*	0.192**	0.419**	0.411**	0.356**	0.191**	0.408**	0.343**	0.728**	1		
15. Sex ^a	0.308**	0.160*	0.016	0.058	0.153*	0.037	0.137*	0.179*	0.197**	0.042	0.166*	0.153*	0.184**	0.188**	1	
16. Age	-0.281**	-0.150*	-0.055	0.052	-0.139*	-0.160*	-0.218**	-0.127	-0.180**	-0.062	-0.169*	-0.289**	-0.161*	-0.059	0.249**	1

NSSI: non-suicidal self-injury; PA: physical abuse; EA: emotional abuse; SA: sexual abuse; EN: emotional neglect; PN: physical neglect.

^aDefining 0 = male, 1 = female.* $p < .05$. ** $p < .01$.

Table 3. Bootstrapping analysis results of the mediation model.

Paths	Effect	95% bias-corrected confidence interval		<i>p</i>
		Lower	Upper	
Total effect	0.280	0.131	0.432	<.001
Direct effect	0.107	−0.097	0.346	.354
Total indirect effect	0.173	−0.027	0.338	.058
Indirect effect 1	−0.053	−0.267	0.093	.565
Indirect effect 2	0.088	0.014	0.186	.039
Indirect effect 3	0.137	0.072	0.251	.002
Compare1	0.141	−0.032	0.360	.162
Compare2	0.190	0.013	0.460	.099
Compare3	0.049	−0.067	0.211	.488

Notes: The direct and indirect effects of childhood maltreatment on non-suicidal self-injury are shown. Indirect effect 1: childhood maltreatment → stressful life events → non-suicidal self-injury; indirect effect 2: childhood maltreatment → negative affect → non-suicidal self-injury; indirect effect 3: childhood maltreatment → stressful life events → negative affect → non-suicidal self-injury. Compare 1: indirect effect 2 – indirect effect 1; compare 1: indirect effect 3 – indirect effect 1; compare 1: indirect effect 3 – indirect effect 2.

significant correlation was found between SA and academic pressure in SLEs or negative affect. Additionally, no significant correlation was found between PA and anxiety. NSSI frequency was positively correlated with five out of six subscales of SLEs (all except for loss), with correlation coefficients ranging from 0.202 to 0.320 ($p < .01$). As a result, the dimension of loss was excluded from the mediation analysis. Negative affect, assessed through depression and anxiety, was significantly correlated with all SLE subscales, with coefficients ranging from 0.191 to 0.530 ($P < .01$). Depression exhibited the highest correlation with health adjustment ($r = 0.530$, $p < .01$). Significant negative correlations were also observed between age and EA ($r = -0.150$, $p < .05$), EN ($r = -0.139$, $p < .05$), PN ($r = -0.160$, $p < .05$), interpersonal relationship ($r = -0.218$, $p < .01$), and depression ($r = -0.161$, $p < .05$), indicating that younger adolescents experienced higher levels of these maltreatment subtypes, interpersonal stress, and depressive symptoms. Finally, the covariates (sex and age) were found to be associated with NSSI frequency ($p < .01$).

3.3. Mediation analysis

The SEM analysis revealed that the hypothesized serial mediation model fit the data well, with the following model fit indices: $\chi^2/df = 1.94$, $p < .001$, RMSEA = 0.064, CFI = 0.945, TLI = 0.929, and SRMR = 0.079. Covariates (age and sex) were both significantly correlated with NSSI. The model explained 31.3% of the total variance in NSSI frequency.

Table 3 presents the total, direct, total indirect, and specific indirect effects of CM on NSSI. The bootstrapping results showed that two of the three indirect paths between childhood maltreatment (CM) and NSSI were significant, whereas the direct path was not. Among the three hypothesized mediation

pathways, the serial pathway involving both stressful life events and negative affect yielded the largest standardized effect ($\beta = 0.137$, 95% CI: 0.072–0.251, $p = .002$). This indirect effect explained 79.19% of the total indirect effect, providing strong support for H3. Additionally, the indirect effect of CM on NSSI via negative affect was also significant ($\beta = 0.088$, 95% CI: 0.014–0.186, $p = .039$; supporting H2), accounting for approximately 50.87% of the total indirect effect.

In contrast, the indirect effect from CM to NSSI through SLEs alone was not statistically significant ($\beta = -0.053$, 95% CI: −0.267 to 0.093, $p = .565$), indicating that H1 was not supported. Due to the negative, nonsignificant effect of this pathway, the combined total indirect effect was also nonsignificant ($\beta = 0.173$, 95% CI: −0.027 to 0.338, $p = .058$). Additional analyses comparing these indirect effects revealed a significant difference between the nonsignificant indirect path (CM → SLEs → NSSI) and the significant serial indirect path (CM → SLEs → negative affect → NSSI), as evidenced by the bootstrapped 95% CI not including zero (Figure 1).

4. Discussion

This study investigated the mediating pathway between CM and NSSI behaviours among adolescents within a psychiatric setting. The findings partially supported our hypothesis: the relationship between CM and NSSI was fully mediated by SLEs and negative affect. CM indirectly influenced NSSI severity through increased negative affect and through a sequential pathway involving both SLEs and negative affect. However, the pathway from CM to NSSI severity via SLEs alone was not statistically significant. To our knowledge, this is the first investigation examining the distal effects of CM on NSSI severity through the serial mediating effects of SLEs and negative affect, grounded in the cumulative adversity theory.

In our clinical adolescent sample, we observed a remarkably high prevalence of NSSI, with 86.28% reporting a history and 74.45% reporting engagement within the past month. This rate exceeds previous reports among Chinese adolescent inpatients, including 78.3% in bipolar disorder (Zhong et al., 2024), and 51.5% in major depressive disorder (Sun et al., 2023). This discrepancy may be attributed to the broader range of psychiatric diagnoses in our sample, including depressive, anxiety, bipolar, and obsessive-compulsive disorders.

Our correlation analysis revealed a significant positive relationship between all subtypes of CM and NSSI severity among adolescents in a psychiatric setting. Emotional abuse was identified as the most relevant subtype of childhood maltreatment with NSSI, consistent with Liu et al. (2018). Emotional abuse is particularly prevalent in China, where

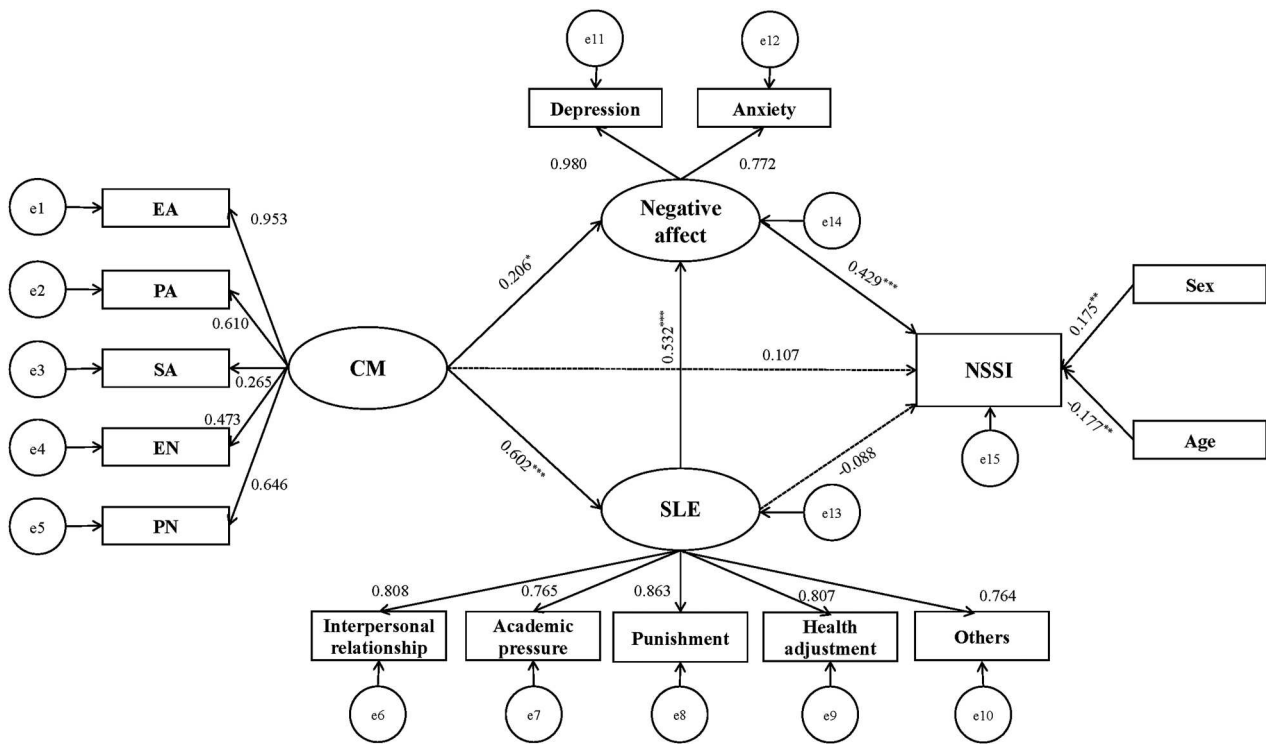


Figure 1. Mediation model between childhood maltreatment and NSSI.

Notes: CM, childhood maltreatment; PA, physical abuse; EA, emotional abuse; SA, sexual abuse; EN, emotional neglect; PN, physical neglect; SLE, stressful life events; NSSI, non-suicidal self-injury. In this model, negative affect is conceptualized as a latent construct represented by two validated symptom-based measures: the Patient Health Questionnaire-9 (PHQ-9), which assesses depressive symptoms, and the Generalized Anxiety Disorder-7 (GAD-7), which measures anxiety symptoms. All path coefficients were standardized; the dashed line indicates the single nonsignificant path, *** $p < .001$, ** $p < .01$, * $p < .05$.

caregivers prioritize children's academic performance over their emotional well-being (Cui et al., 2021). This imbalance can impair adolescents' ability to regulate negative emotions, potentially leading to maladaptive coping strategies like NSSI (Gruhn & Compas, 2020). In contrast to Liu et al. (2018), who found no significant association between emotional neglect and NSSI, our study revealed emotional neglect as the most severe subtype of childhood maltreatment in our sample, significantly associated with NSSI frequency. This finding aligned with previous research in Chinese clinical adolescents (Hu et al., 2023). The Chinese cultural context may have influenced these results, as parents often exhibit lower acceptance and satisfaction with their children, leading to emotional alienation and neglect of their children's emotional needs (Cui et al., 2021; Hou et al., 2023). Notably, our findings revealed significant negative correlations between age and emotional abuse, emotional neglect, physical neglect, interpersonal relationship stress, and depressive symptoms, indicating that younger adolescents were more vulnerable to certain maltreatment experiences, stressors, and emotional distress. These age-related differences suggest that developmental factors may influence the severity or perceived impact of maltreatment and stressors, which should be considered in future research and targeted interventions.

A previous study suggested that SLEs are associated with NSSI only in adolescents who have experienced CM, indicating that CM may sensitize individuals to later stressors more proximal to NSSI (Gao et al., 2024). Similarly, Layne et al. (2014) found that cumulative adversity is associated with a dose-response increase in the risk of adolescent self-injurious behaviour. However, our results did not support SLEs as an independent mediator of the relationship between CM and NSSI. Instead, SLEs acted as a serial mediator through negative affect, particularly depression and anxiety, influencing the relationship between CM and NSSI. This discrepancy may stem from the fact that our study offered a more comprehensive explanation of the cumulative adversity theory by incorporating negative affect into the framework. From this perspective, the accumulation of stressors across developmental periods intensifies negative affect, which ultimately increases the likelihood and severity of NSSI (Turner & Colburn, 2022). In this way, cumulative adversity is not merely the sum of isolated negative experiences but the accumulation of emotional responses.

While the exact mechanisms underlying this cumulative adversity theory remain unclear, these processes likely involve emotional and neurobiological pathways (Gao et al., 2024). Emotional dysregulation, for example, may play a key role in the cumulative

adversity theory. Previous research has shown that exposure to CM impairs emotion regulation, leading to maladaptive coping mechanisms such as NSSI (Hu et al., 2023; Liu et al., 2018). These findings are consistent with those of Qian et al. (2022), who found that adolescents with a history of CM exhibit heightened emotional sensitivity to minor stressors, increasing their reliance on NSSI to cope with overwhelming distress. As a result, the cumulation of childhood maltreatment and recent SLEs create a reinforcing cycle of emotional dysregulation, exacerbating emotional symptoms and increasing reliance on NSSI as a maladaptive coping strategy (Jiang et al., 2022; Layne et al., 2014; Zheng et al., 2022). Furthermore, exposure to stressors during early childhood and adolescence has been found to disrupt physiological systems that regulate stress and emotional responses, such as the hypothalamic–pituitary–adrenal axis and the autonomic nervous system (Ringwald et al., 2022; Zhu et al., 2023). Therefore, individuals exposed to childhood maltreatment may exhibit heightened physiological and emotional reactivity to later stressors, making it more difficult to regulate negative emotions (Myers et al., 2014). This increased reactivity may predispose adolescents to engage in NSSI following SLEs (Gao et al., 2024).

The mediating effect of negative affect between CM and NSSI is consistent with previous research (Hu et al., 2023; Zhang et al., 2024), whether in cross-sectional or longitudinal study designs. In our study, negative affect emerged as the strongest mediator. Neither CM nor SLEs directly lead to NSSI; rather, they indirectly lead adolescents to engage in NSSI by eliciting negative affect. This suggests that negative affect is a necessary prerequisite for the onset of NSSI behaviour. This finding supports our perspective on the cumulative adversity effect and provides further evidence for the mental mechanisms underlying the development of NSSI. According to the emotion dysregulation model, chronic stressors impair emotional regulation, creating a cycle of distress and maladaptive behaviours that reinforce self-injury as a coping mechanism (Gratz & Roemer, 2004).

Overall, these findings highlighted the unique contributions of cumulative adversity theory to NSSI behaviour in adolescence, suggesting several tailored prevention and intervention strategies. First, given the predicted role of SLEs in NSSI frequency, stress prevention programmes targeting adolescents should be considered (Liu et al., 2023). Second, due to the severity of emotional abuse and neglect experienced in our sample, parenting interventions are crucial to promote positive parenting practices (Zhang et al., 2024). As highlighted by Hua et al. (2024), a positive family environment may offer adequate resources for resolving SLEs and protecting adolescents from emotional distress. Third, strengthening adolescents'

psychological resilience through resilience-training programmes could help mitigate the detrimental effects of chronic stressors and prevent subsequent emotional symptoms (Chmitorz et al., 2018; Zheng et al., 2022). Finally, targeted interventions should focus on reducing emotional distress and promoting adaptive coping strategies. Therapeutic approaches such as Cognitive Behavioural Therapy and Dialectical Behaviour Therapy could help adolescents develop healthier emotion regulation skills and coping mechanisms to manage distress (Berking et al., 2013; Mousavi et al., 2022; Nakao et al., 2021). Moreover, given the global prevalence of NSSI and childhood maltreatment, and the cultural variability in their underlying mechanisms, culturally sensitive interventions and international collaboration are urgently needed to enhance the effectiveness and generalizability of prevention and treatment efforts across diverse adolescent populations.

There were several limitations to this study. First, the cross-sectional design of this study limits the ability to draw causal conclusions, necessitating longitudinal research to better establish the temporal sequence between CM, SLEs, negative affect, and NSSI. Second, the reliance on self-report measures may introduce recall or response biases; therefore, future research should incorporate multi-informant assessments (e.g. from caregivers, teachers, or clinicians) and objective measures where feasible. Third, the interpretation and generalizability of our findings should be considered in light of both the cultural specificity of the measured constructs and the limited diversity of the study sample. The sample consisted solely of Chinese adolescents in a psychiatric inpatient setting, limiting the generalizability of these findings to community-based, non-clinical, or culturally diverse populations. In addition, diversity-related factors, such as socioeconomic status, ethnicity, gender identity, sexual orientation, religion, and geography, could also influence adolescents' experiences of maltreatment, stressors, and emotional distress, potentially moderating the observed mediation pathways. As a result, the cumulative adversity framework examined in this study might be especially relevant to adolescents experiencing severe psychiatric conditions, but may not directly generalize to community samples or adolescents from other cultural or socioeconomic backgrounds. Furthermore, constructs such as CM, SLEs, negative affect, and NSSI are significantly shaped by local cultural contexts. For instance, Chinese cultural norms emphasizing academic achievement and obedience may heighten emotional abuse and neglect (Kim et al., 2013), while stigma around mental health may lead adolescents to internalize distress rather than seek support (Chen et al., 2014; Yang et al., 2020). Cultural modesty norms may further reinforce emotional suppression, potentially increasing internalized

negative affect and maladaptive coping behaviours such as NSSI (Kim et al., 2019; Yong et al., 2023). While the cumulative adversity framework offers a strong conceptual basis, its generalizability may be moderated by such individual and contextual differences. Future research should investigate these relationships across diverse and cross-cultural samples to evaluate the robustness and global applicability of our findings.

5. Conclusion

This study provided empirical support for a serial mediation model linking CM to NSSI through the sequential roles of SLEs and negative affect. Our findings highlight the importance of considering both past trauma and ongoing stressors in understanding the complex mechanisms underlying NSSI in adolescents. Clinically, the results underscore the need for comprehensive, trauma-informed interventions that simultaneously focus on managing current life stressors and reducing negative emotional states such as depression and anxiety. Mental health professionals should prioritize enhancing adolescents' emotion regulation skills and coping strategies, particularly in psychiatric settings where the prevalence and severity of NSSI are heightened. Policy-wise, these findings advocate for integrating screening protocols for maltreatment histories and emotional distress into routine adolescent mental health assessments, ensuring timely identification and targeted support for high-risk individuals. Future research should continue to explore these pathways using longitudinal designs and diverse populations to enhance generalizability and inform clinical practice further.

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Disclosure statement

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Juan He  <http://orcid.org/0009-0008-1095-8569>

Yamin Li  <http://orcid.org/0000-0002-8396-5208>

Jianjun Ou  <http://orcid.org/0000-0002-0611-7715>

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