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Maternal Childhood Trauma and Adolescent Internalizing and Externalizing Problems: An Evolutionary Perspective on Intergenerational Transmission

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Abstract

The intergenerational effects of maternal childhood trauma on offspring's internalizing and externalizing problems have been identified. However, few studies have explored the indirect pathways of these effects from the evolutionary-developmental perspective. The present study aimed to investigate the intergenerational association between maternal childhood trauma and internalizing and externalizing problems among adolescents, as well as the indirect effects of adolescent childhood trauma and life history strategies in these links. A total of 208 adolescents and their mothers were recruited in this study. Adolescents completed the Childhood Trauma Questionnaire (CTQ), Mini-K scale, and Achenbach Youth Self-Report scale, and mothers reported their own childhood trauma by CTQ. Maternal childhood trauma was positively related to adolescent childhood trauma, fast life history strategies, and internalizing and externalizing problems. Indirect effect analysis further revealed that the association between maternal childhood trauma and adolescent internalizing and externalizing problems operated through both separate and serial indirect pathways via adolescent childhood trauma and life history strategies. These findings demonstrate that adolescent childhood trauma and life history strategies function as important indirect pathways in the intergenerational associations between maternal childhood trauma and adolescent internalizing and externalizing problems.

1. Introduction

Childhood trauma refers to the psychological or physical injuries suffered by individuals during childhood, including physical, emotional, and sexual abuse, as well as emotional and physical neglect (Bernstein & Fink, 1998; Felitti et al., 1998). Childhood trauma is regarded as an environmental risk factor that has far-reaching impacts on psychopathology (Scully et al., 2020). As the most widely recognized classification criteria of psychopathology (Achenbach et al., 2016), internalizing problems refer to fundamental disorders in internalized emotions and moods, such as anxiety, depression, and somatic complaints, while externalizing problems refer to behaviors that are harmful and disruptive to others, including aggression and delinquency (Achenbach et al., 2016). Adolescence is a sensitive period to childhood trauma (Yoon, 2022), and a peak time for internalizing and externalizing problems (Doom et al., 2016). Childhood trauma is not only found to be closely associated with increased risks of internalizing and externalizing problems in adolescents (Bevilacqua et al., 2021; Wei & Lü, 2023), but also has an intergenerational effect on offspring's internalizing and externalizing problems with adolescents whose parents are exposed to higher levels of childhood trauma are more likely to show increased internalizing and externalizing problems (Bravo et al., 2023; Ma et al., 2022; Sauvé et al., 2022). Some studies have preliminarily examined the potential mechanisms including maternal psychopathology, harsh parenting, or adolescent childhood trauma underlying the intergenerational effect of maternal childhood trauma on adolescent internalizing and externalizing problems (Bravo et al., 2023; Gong et al., 2024; Ma et al., 2022; Plant et al., 2017). However, few studies have explored the issue from the evolutionary-developmental perspective. Considering that stressful environments such as early adversity may prompt the development of costly but potentially adaptive strategies (Ellis & Del Giudice, 2019), the present study sought to investigate the indirect effects of adolescent childhood trauma and life history

strategies on the links between maternal childhood trauma and adolescent internalizing and externalizing problems.

1.1 The intergenerational effect of childhood trauma on internalizing and externalizing problems

Intergenerational effect of childhood trauma refers to the harmful effects of childhood trauma that may be transmitted from one generation to the next (McDonnell & Valentino, 2016; Roubinov et al., 2022; Su et al., 2022; Yehuda & Lehrner, 2018). Parental childhood trauma negatively impacts the development of offspring, especially in terms of psychopathological symptoms including internalizing and externalizing problems (Sauvé et al., 2022; Schickedanz et al., 2018; Wang et al., 2023). Although both maternal and paternal childhood trauma are shown to be associated with offspring's internalizing and externalizing problems (Sauvé et al., 2022; Wang et al., 2023), maternal rather than paternal childhood trauma has been indicated to exert a stronger influence on child behavioral problems because the mother is generally the primary caregiver (Schickedanz et al., 2018). Accumulated empirical and meta-analysis studies have shown that maternal childhood trauma, as a distal risk factor, is closely related to internalizing and externalizing problems among adolescents (Gong et al., 2024; Kang et al., 2021; Lee et al., 2023; Plant et al., 2018) and children (Cooke et al., 2019; Rijlaarsdam et al., 2014; Roubinov et al., 2022; Van De Ven et al., 2020; Su et al., 2022), suggesting robust intergenerational links between maternal childhood trauma and offspring's internalizing and externalizing problems.

1.2 Adolescent childhood trauma as an indirect pathway

The cycle of violence hypothesis (Curtis, 1963) posits that violence breeds violence and that childhood victimization by violence increases the likelihood of delinquency, adult criminality, and violent criminal behavior. As an extension of the cycle of violence hypothesis, the "cycle of maltreatment" hypothesis (Madigan et al., 2019; Thornberry et al., 2012; Widom, 1989a) specifically claims that parental traumatic experiences are likely to be transmitted to their offspring. From this theoretical perspective, maternal childhood trauma may increase the risk of exposure to childhood trauma in the next generation. Meta-analysis studies have shown that parents with childhood traumatic experiences are two or three times more likely to have children who experience trauma, compared to children whose parents did not experience childhood trauma (Assink et al., 2018; Madigan et al., 2019). Recent empirical evidence has also demonstrated that maternal childhood trauma is positively associated with adolescent childhood trauma (Bolhuis et al., 2023; Gong et al., 2024). Additionally, adolescents with higher levels of childhood trauma have more internalizing and externalizing problems (Bevilacqua et al., 2021; Hicks et al., 2021; Merrick et al., 2015; Wei & Lü, 2023; Zwierzynska et al., 2013). Studies have further found that the relations between maternal childhood trauma and adolescent internalizing and externalizing problems are mediated by adolescent childhood trauma (Gong et al., 2024; Plant et al., 2017). Therefore, adolescent childhood trauma is assumed to play an indirect role in the relationship between maternal childhood trauma and both internalizing and externalizing problems among adolescents.

1.3 Life history strategies as an indirect pathway

From an evolutionary-developmental perspective, stressful environments do not so much impair development as direct or regulate it toward strategies that are adaptive under such conditions (Ellis & Del Giudice, 2014; Ellis et al., 2012). Life history strategies are adaptive strategies that individuals use to allocate limited resources and energy among various life tasks to optimize survival and reproduction. Life history strategies are shaped by the early life environment and constructed in a fast-slow continuum (Ellis et al., 2009; Figueredo et al., 2006; Giudice et al., 2015). Fast life history strategies are characterized by accelerated physical development, early maturation, and intense mating effort, ultimately resulting in a larger number of offspring, while slow life history strategies are characterized by slower growth, delayed maturation and reproduction, and a greater emphasis on the accumulation of resources, knowledge, and skills (Ellis et al., 2009). The optimal strategy depends on the environment in which a strategy is enacted, and exposure to stressful environments such as harshness or unpredictability can accelerate life history strategies (Ellis et al., 2009; Szepsenwol & Simpson, 2019). Childhood trauma, as a typical unpredictable and harsh environment, is found to be associated with fast life history strategies (Brüne et al., 2017; Gong et al., 2023; Láng & Lénárd, 2015; Zakreski & Pruessner, 2019). Differential life history strategies lead to distinct behavior and developmental outcomes, with slow life history strategies are associated with somatic effort, later reproductive age, and delayed gratification behaviors (Copping et al., 2013; Del Giudice, 2016; Kruger, 2017; Uggla & Mace, 2015), while fast life history strategies are associated with higher levels of internalizing and externalizing problems such as aggression and impulsivity (Chang & Lu, 2018; Griskevicius et al., 2011; Mittal & Griskevicius, 2014). Recent studies have further shown that life history strategies play a mediating role in the relationships between adolescent childhood trauma and internalizing and externalizing problems (Chang et al., 2021; Fan & Meng, 2022). Maternal childhood trauma and adolescent childhood trauma can be considered as the distal and proximal harsh environmental factors for adolescent life history strategies. Therefore, it is possible to assume that life history strategies may serve an independent indirect pathway in relations between adolescent childhood trauma and internalizing and externalizing problems, and maternal childhood trauma and adolescent internalizing and externalizing problems. Additionally, maternal childhood trauma may be linked with adolescent internalizing and externalizing problems via a serial effect from adolescent childhood trauma to life history strategies.

1.4 The present study

The present study aimed to investigate the intergenerational associations between maternal childhood trauma and adolescent internalizing and externalizing problems, and the indirect effects of adolescent childhood trauma and life history strategies in the relationships. Based on the literature viewed above, it was hypothesized that (1) Maternal childhood trauma would be positively associated with internalizing and externalizing problems among adolescents. (2) Adolescent childhood trauma and adolescent life history strategies would play an independent indirect role linking maternal childhood trauma with adolescent internalizing and externalizing problems. (3) Adolescent childhood trauma and adolescent life history strategies would play a serial indirect role in the associations between maternal childhood trauma and adolescent internalizing and externalizing problems. The hypothesis model of this study is shown in Fig. 1.

INSERT FIGURE 1 HERE

2. Methods

2.1 Participants

In the present study, a total of 220 adolescents and their mothers were recruited by convenience sampling from a middle school in Northwest China. After eliminating data of 12 participants with mismatched or incomplete responses, the final sample included 208 participants, with children ranging in age from 12 to 15 years (*M* = 12.88 years, *SD* = 0.78; 58% females) and mothers ranging in age from 33 to 60 years (*M* = 40.87 years, *SD* = 5.50). Inclusion criteria included full completion of the questionnaires, voluntary participation, and written informed consent from mothers and assent from adolescents. The demographic information of the sample is shown in Table 1.

Table 1
The demographic information of the sample

Adolescent related variables	**Frequency**	**%**
Adolescent gender		
Male	87	41.83%
Female	121	58.17%
Adolescent childhood trauma		
Physical abuse ≥ 10	15	7.21%
Emotional abuse ≥ 13	27	12.98%
Sexual abuse ≥ 8	14	6.73%
Physical neglect ≥ 10	74	35.58%
Emotional neglect ≥ 15	72	34.62%
Adolescent internalizing problems	8	3.85%
Adolescent externalizing problems	8	3.85%
Maternal related variables		
Maternal childhood trauma		
Physical abuse ≥ 10	19	9.13%
Emotional abuse ≥ 13	21	10.10%
Sexual abuse ≥ 8	11	5.29%
Physical neglect ≥ 10	79	37.98%
Emotional neglect ≥ 15	90	43.27%
Family related variables		
Average monthly household income		
Less than ¥3000	50	24.0%
¥3000 – ¥7000	104	50.0%
¥7000 – ¥10,000	37	17.8%
Above ¥10,000	17	8.2%
Maternal highest occupation		

Adolescent related variables	Frequency	%
Temporary workers	102	49.04%
Manual workers	49	23.56%
Ordinary managers	43	20.67%
Middle managers	11	5.29%
Senior managers	3	1.44%
Educational background of mother		
Illiteracy	102	49.0%
Primary school	49	23.6%
Junior high school	43	20.7%
High school	11	5.3%
University	3	1.4%
Postgraduate or above	0	0%
Note. *N* = 208		

INSERT Table 1 HERE

2.2 Procedure

This study protocol was approved by the research ethics committee of the authors' university. Informed consent was obtained from mothers and assent was secured from adolescents. Adolescents received identical instructions from trained research assistants to complete the Childhood Trauma Questionnaire (CTQ), Mini-K scale, and Achenbach Youth Self-Report scale in the test room. The Childhood Trauma Questionnaire for mothers was taken home by each adolescent for the mother to complete. The completed questionnaires were returned in sealed envelopes to the researchers on the following day. Participants were assured that all collected data would be kept strictly confidential and used solely for research purposes. Participants received a gift as compensation.

2.3 Measures

2.3.1 Adolescent and maternal childhood trauma

The Chinese version of the Bernstein Childhood Trauma Questionnaire (Bernstein et al., 2003) was used in the current study to assess childhood trauma of adolescents and mothers, which was shown to have good reliability and validity in the Chinese sample (Fu et al., 2005; Li et al., 2006). The scale contains 28

items divided into five sub-dimensions: physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect. Items are rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (very often). Each sub-dimension contains five items, and three items are only for evaluation without scoring. Thus, the total score ranges from 25 to 125, with higher values indicating higher exposure to childhood trauma experiences. The Cronbach's alpha of this scale was 0.87 for adolescents and 0.89 for their mothers in this study.

2.3.2 Adolescent life history strategies

The Chinese version of the Mini-K scale (Figueredo et al., 2006) was used to measure adolescent life history strategies, which has good reliability and validity (Sai et al., 2022). Because most Chinese students are atheists and rarely participate in religious activities, the scale deletes the item "I am closely connected to and involved in my religion". The scale includes 19 items and 3 sub-dimensions, including 6 items of deliberate consideration, 6 items of intimate concern, and 7 items of social connection. Items are rated on a 7-point scale from 1 (disagree strongly) to 7 (agree strongly). The total score ranges from 19 to 133. In the present study, the original scale was scored reversely, with a higher score indicating a fast life history strategy. The Cronbach's alpha of this scale was 0.91 in this study.

2.3.3 Adolescent internalizing and externalizing problems

The Chinese version of the Achenbach Youth Self-Report (YSR; Achenbach & Rescorla, 2001) was used to measure adolescent behavioral and emotional functioning, which was shown to have good reliability and validity (Wang et al., 2013). The scale contains 112 items divided into eight sub-dimensions, while internalizing problems include three sub-dimensions: anxious/depressed, withdrawn/depressed, and somatic complaints, and externalizing problems include two sub-dimensions: aggressive behavior and rule-breaking behavior. Items are rated on a three-point scale from 0 (not true) to 2 (very true or often true), with higher scores indicating higher levels of internalizing and externalizing problems. The Cronbach's alpha of the subscale of internalizing symptoms and externalizing problems were 0.93 and 0.89, respectively.

2.4 Statistical analyses

Data were analyzed using SPSS 26.0. All continuous variables were standardized before analysis. First, the relationships between variables were analyzed via Pearson correlation analysis. Second, the PROCESS macro (Model 6) was adopted to examine the serial indirect effects. Specifically, maternal childhood trauma was entered as an independent variable, adolescent childhood trauma and life history strategies as two sequential pathway variables, and adolescent internalizing problems and externalizing problems as the dependent variables, respectively. To test the significance of the direct, indirect, and total effects, 5,000 bootstrap samples were generated to obtain 95% bias-corrected bootstrap confidence intervals. If the confidence intervals do not contain zero, the direct/ indirect/ total effects are considered to be significant. The tests were two-tailed with an alpha level of 0.05.

3. Results

3.1 Assessment of common method biases

The Harman single-factor test was employed to assess the common method biases (Podsakoff et al., 2003). All 98 items reported by adolescents in the questionnaires were included in an exploratory factor analysis without rotation. The analysis produced 26 common factors with the first one explaining 18.53% of the variance, which was lower than the critical standard of 40% (Zhou et al., 2004). This result indicated that the significant relations among all study variables were not driven purely by common method biases in the present study.

3.2 Correlation analysis among variables

The correlation, mean, and standard deviation among all study variables are shown in Table 2.

Table 2
Descriptive statistics and correlations among all study variables.

1 Adolescent Gender	***M* (*SD*)**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	-	**-**							
2 SES	0 (1.76)	-0.15*	-						
3 Adolescent age	12.88 (0.78)	0.02	-0.19**	-					
4 Maternal age	40.87 (5.50)	-0.20**	-0.07	0.08	-				
5 Maternal childhood trauma	41.27 (12.48)	0.09	-0.03	0.17**	0.02	-			
6 Adolescent childhood trauma	40.31 (11.45)	-0.02	0.04	0.12*	0.03	0.30**	-		
7 Adolescent life history strategies	52.92 (18.12)	-0.05	-0.09	0.004	0.12	0.26**	0.24**	-	
8 Adolescent Internalizing problems	10.87 (9.14)	0.17**	-0.17*	0.07	0.11	0.31**	0.36**	0.31**	-
9 Adolescent Externalizing problems	9.25 (6.98)	-0.01	-0.15*	0.15*	0.12	0.27**	0.31**	0.25**	0.77**

Note. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; girl = 1, boy = 0

INSERT Table 2 HERE

The results of Pearson correlations showed that maternal childhood trauma was positively correlated with adolescent childhood trauma ($r = 0.30$, $p < 0.01$), adolescent life history strategy ($r = 0.26$, $p < 0.01$), internalizing problems ($r = 0.31$, $p < 0.01$) and externalizing problems ($r = 0.27$, $p < 0.01$). Adolescents' childhood trauma was positively correlated with adolescent life history strategy ($r = 0.24$, $p < 0.01$), internalizing problems ($r = 0.36$, $p < 0.01$) and externalizing problems ($r = 0.31$, $p < 0.01$). Additionally, there was a correlation between adolescent life history strategy and adolescent internalizing problems ($r = 0.31$, $p < 0.01$). Furthermore, adolescent life history strategies were correlated with externalizing problems ($r = 0.25$, $p < 0.01$).

3.3 Associational variable analysis

The results of the above correlation analysis fit the statistical requirements for further tests of indirect effects on maternal childhood trauma and adolescent internalizing and externalizing problems. As shown in Fig. 2, maternal childhood trauma positively predicted adolescent childhood trauma ($\beta = 0.30$, $p < .001$, 95% CI [0.17, 0.42]) and life history strategies ($\beta = 0.19$, $p = 0.007$, 95% CI [0.05, 0.33]) and internalizing problems ($\beta = 0.18$, $p = 0.006$, 95% CI [0.05, 0.32]) and externalizing problems ($\beta = 0.17$, $p = 0.016$, 95% CI [0.03, 0.30]). Adolescent childhood trauma positively predicted adolescent life history strategies ($\beta = 0.22$, $p = 0.002$, 95% CI [0.09, 0.36]), internalizing problems ($\beta = 0.25$, $p < 0.001$, 95% CI [0.11, 0.38]) and externalizing problems ($\beta = 0.19$, $p = 0.009$, 95% CI [0.05, 0.32]). Adolescent life history strategies positively predicted internalizing problems ($\beta = 0.21$, $p = 0.002$, 95% CI [0.08, 0.34]) and externalizing problems ($\beta = 0.18$, $p = 0.010$, 95% CI [0.04, 0.31]).

INSERT FIGURE 2 HERE

The results of the serial indirect effects of maternal childhood trauma and adolescent internalizing and externalizing problems were shown in Table 2. In the total effect model of internalizing problems, maternal childhood trauma had a significant predictive effect on adolescent internalizing problems ($\beta = 0.31$, $p < 0.001$, 95% CI [0.180, 0.441]). Additionally, the direct ($\beta = 0.183$, $p < 0.01$, 95% CI [0.052, 0.315]) and indirect effects ($\beta = 0.127$, 95% CI [0.063, 0.204]) are both significant. The indirect effect accounted for 41% of the total effect of maternal childhood trauma on adolescent internalizing problems. In the total effect model of externalizing problems, maternal childhood trauma had a significant predictive effect on adolescent externalizing problems ($\beta = 0.27$, $p < 0.001$, 95% CI [0.136, 0.398]). Moreover, the direct ($\beta = 0.17$, $p < 0.05$, 95% CI [0.032, 0.302]) and indirect effects ($\beta = 0.10$, 95% CI [0.046, 0.169]) are also both significant. The indirect effect accounted for 37% of the total effect of maternal childhood trauma on adolescent externalizing problems.

As shown in Table 3, the total indirect effects of internalizing and externalizing problems included three paths, respectively. In the relationship between maternal childhood trauma and adolescent internalizing problems, the independent indirect effect of adolescent childhood trauma was significant, with 95% CI [0.027, 0.129], and the independent indirect effect of adolescent life history strategies was also significant, with 95% CI [0.006, 0.092]. In addition, the serial indirect effect of adolescent childhood trauma and life history strategies was also significant, with 95% CI [0.003, 0.034]. In the relationship

between maternal childhood trauma and adolescent externalizing problems, the independent indirect effect of adolescent childhood trauma was significant, with 95% CI [0.011, 0.108], and the independent indirect effect of life history strategies was also significant, with 95% CI [0.005, 0.077]. In addition, the serial indirect effect of adolescent childhood trauma and life history strategies was also significant, with 95% CI [0.002, 0.028].

Table 3
Analysis of indirect effect.

Path	**Effect**	***SE***	**LLCI**	**ULCI**	**Ratio of indirect to total effect**
Maternal childhood trauma → adolescent internalizing problems					
Total effect	0.31	0.07	0.180	0.441	-
Direct effect	0.183	0.07	0.052	0.315	-
Total indirect effect	0.127	0.04	0.063	0.204	41%
Maternal childhood trauma → adolescent childhood trauma → adolescent internalizing problems	0.073	0.03	0.027	0.129	23.5%
Maternal childhood trauma → adolescent life history strategy → adolescent internalizing problems	0.040	0.02	0.006	0.092	13%
Maternal childhood trauma → adolescent childhood trauma → adolescent life history strategy → adolescent internalizing problems	0.014	0.01	0.003	0.034	4.5%
Maternal childhood trauma→adolescent externalizing problems					
Total effect	0.27	0.07	0.136	0.398	-
Direct effect	0.17	0.07	0.032	0.302	-
Total indirect effect	0.10	0.03	0.046	0.169	37%
Maternal childhood trauma → adolescent childhood trauma → adolescent externalizing problems	0.06	0.02	0.011	0.108	22.2%
Maternal childhood trauma → adolescent life history strategy → adolescent externalizing problems	0.03	0.02	0.005	0.077	11.1%
Maternal childhood trauma → adolescent childhood trauma → adolescent life history strategy →adolescent externalizing problems	0.01	0.01	0.002	0.028	3.7%
Note. Ratio of indirect to total effect = indirect effect / total effect					

INSERT Table 3 HERE

4. Discussion

The present study found that maternal childhood trauma was positively related to adolescent internalizing and externalizing problems. A growing body of research from the intergenerational transmission perspective has demonstrated that parental childhood trauma is strongly associated with offspring's internalizing and externalizing problems (Sauvé et al., 2022; Wang et al., 2023). Mothers generally are the primary caregivers and spend more time with children, and maternal rather than paternal childhood trauma has been found to exert a stronger influence on behavioral problems such as depression, anxiety, suicide attempts, and aggressive behavior among adolescents (Gong et al., 2024; Kang et al., 2021; Lee et al., 2023; Su et al., 2022). Consistent with these intergenerational studies of maternal childhood trauma, the findings of the present study suggest that adolescents whose mothers experienced childhood trauma were more likely to develop internalizing and externalizing problems, adding evidence in support of the intergenerational effect of childhood trauma.

This study also explored the potential indirect pathways linking maternal childhood trauma to adolescent internalizing and externalizing problems. Consistent with previous studies (Gong et al., 2024), this study found that adolescent childhood trauma played an independent indirect role in the link between maternal childhood trauma and adolescent internalizing and externalizing problems. The present study, together with previous studies, provides empirical evidence for "the cycle of maltreatment" hypothesis (Thornberry et al., 2012; Widom, 1989b), suggesting that mothers who experience childhood trauma are more likely to treat their children similarly, leading adolescents to experience childhood trauma and further triggering internalizing and externalizing problems.

Furthermore, the present study tested the indirect effect of life history strategies in the links between maternal childhood trauma, adolescent childhood trauma and adolescent internalizing and externalizing problems. Life history strategies served as an independent indirect pathway in the relationship between both maternal and adolescent childhood trauma and adolescent internalizing and externalizing problems. From the perspective of evolution-development, exposure to a stressful environment such as childhood trauma can accelerate life history strategies, albeit at the cost of mental health, such as internalizing and externalizing problems. Previous studies have shown that individuals exposed to harsh childhood environments, such as trauma, often anticipate an unpredictable future and adopt fast life history strategies (e.g., Láng & Lénárd, 2015; Zakreski & Pruessner, 2019). These strategies, in turn, result in increased problems such as impulsivity (e.g., Chang & Lu, 2018; Griskevicius et al., 2011). The present study confirmed that fast life history strategies serve as an indirect variable linking both maternal and adolescent childhood trauma to adolescent internalizing and externalizing problems. In addition, extending previous research, this study is the first to demonstrate that maternal childhood trauma is associated with adolescent internalizing and externalizing problems through a sequential indirect pathway from adolescent childhood trauma to fast life history strategies. Maternal childhood trauma, as a distal harsh environment, is more likely to increase harsh parenting practices such as physical

punishment (Bravo et al., 2023), thereby forming a proximal harsh environment like childhood trauma for adolescents. Exposure to a cumulative harsh environment is associated with a higher likelihood of adopting fast life history strategies, subsequently increasing the risk of internalizing and externalizing problems in adolescents.

Several limitations should be acknowledged in the present study. First, this study employed a cross-sectional design with a relatively small sample size, and only established the correlation between variables, which cannot establish temporal relationships between research variables (Weems, 2025). Subsequent studies are supposed to confirm the causality of these variables in a larger sample based on a longitudinal design. Second, findings of the present study were obtained based on self-reports from mothers and adolescents, which may be subject to recall bias. Multiple methods incorporating semi-structured questionnaires and assessments given by teachers and peers should be employed in future studies. Third, the present study mainly considered the primary caregivers (i.e., mothers). Differential intergenerational effects of paternal and maternal childhood trauma should be compared in the following studies.

4. Conclusion

The present study found that maternal childhood trauma was associated with adolescent internalizing and externalizing problems through distinct pathways: independently via adolescent childhood trauma and life history strategies, and sequentially via an indirect pathway from adolescent childhood trauma to life history strategies. These findings may shed light on the mechanisms underlying the intergenerational effect of maternal childhood trauma on adolescent internalizing and externalizing problems within the framework of evolution-development. Additionally, the findings of this study have implications for interventions aimed at mitigating the detrimental intergenerational effects of maternal childhood trauma on adolescent mental health.

Declarations

Ethical Approval: This study was approved by the local Institutional Review Board.

Consent to Participate and Consent to Publish: All participants provided written informed consent prior to participating. Informed consent for publication was provided by the participants.

Competing interests: The authors declare no competing interests.

Authorship contributions: Author 1 developed the study concept and provided major revisions. Author 2 collected and analyzed the data under the supervision of Author 1. Author 2 drafted the manuscript. All authors made revisions to the manuscript and approved the final version of the manuscript for submission.

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Availability of Data and Materials: The data that support the findings of this study are available on request from the corresponding author. All of the materials and measures used in this research are widely available or are fully described in the manuscript.

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Figures

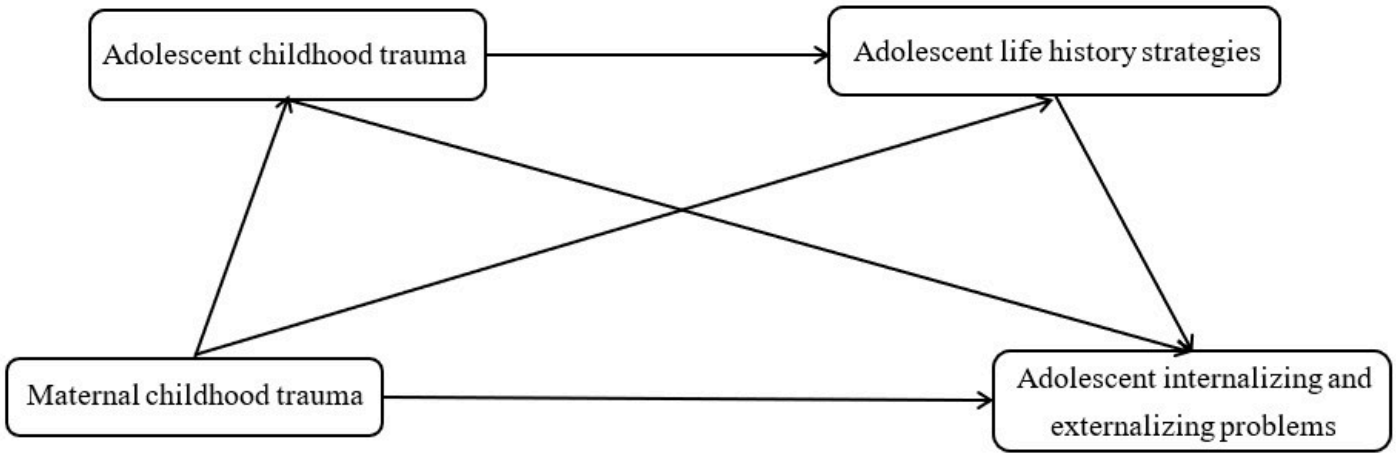


Figure 1

Conceptual model

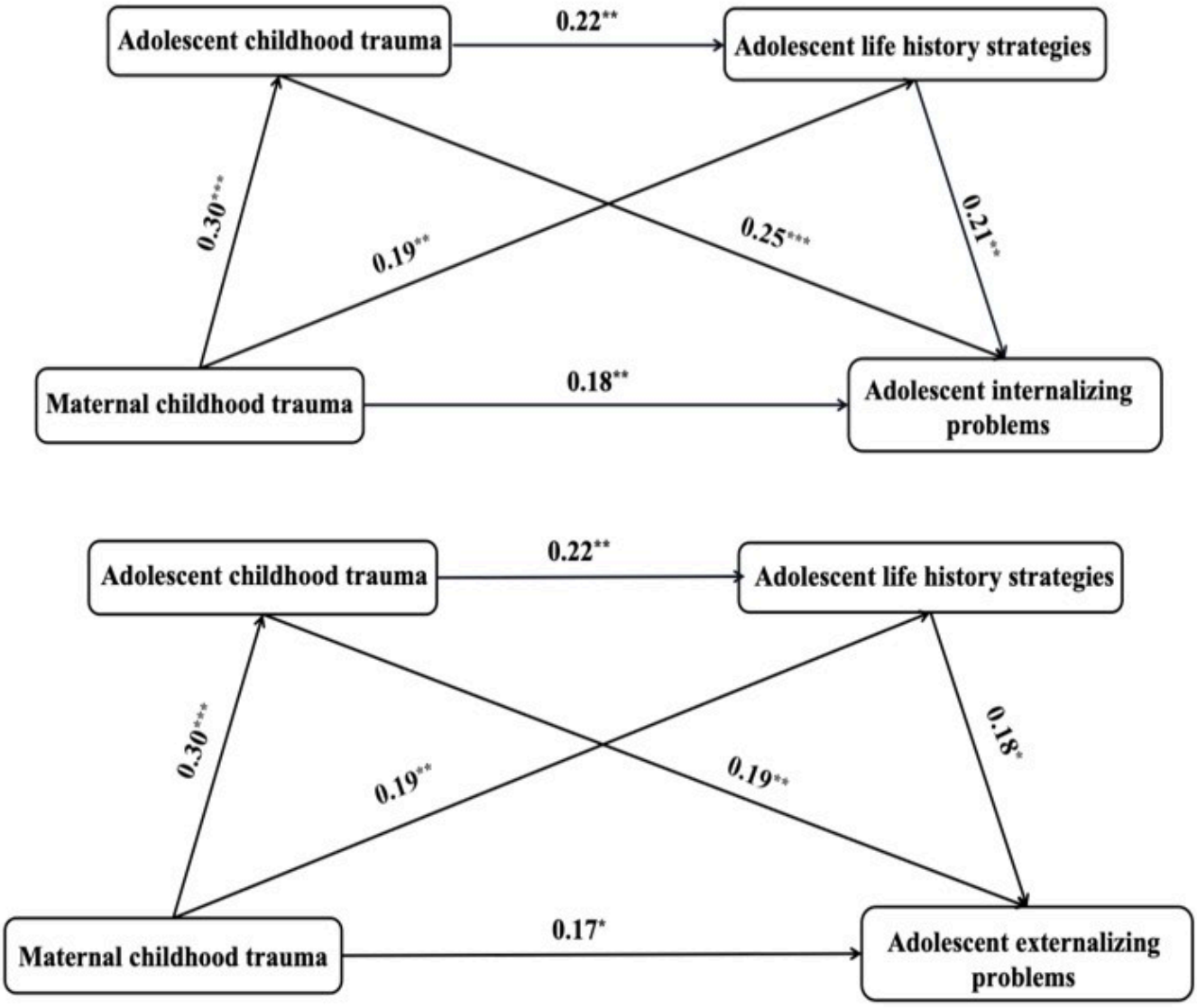


Figure 2

Model of the chain mediation. * *p* □ 0. 05; ***p* □ 0. 01; ****p* □ 0. 001.