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The effect of interparental conflict on non-suicidal self-injury in middle school students: a moderated mediation model of self-esteem and regulatory emotional self-efficacy

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Abstract

This study examined the effects of interparental conflict on non-suicidal self-injury in middle school students and investigated the mediating role of self-esteem and the moderating role of regulatory emotional self-efficacy. A total of 1,072 middle school students were recruited to participate in this study and anonymously completed the Children's Perception of Interparental Conflict Scale, Self-esteem Scale, Regulatory Emotional Self-efficacy Scale, and Adolescent Self-Injury Questionnaire. The results were as follows: (1) Interparental conflict positively predicted non-suicidal self-injury in middle school students; (2) self-esteem mediated the relationship between interparental conflict and non-suicidal self-injury; (3) the relationship between self-esteem and non-suicidal self-injury was moderated by regulatory emotional self-efficacy. These findings provide a new avenue for reducing and preventing non-suicidal self-injury among middle school students.

Keywords Interparental conflict, Non-suicidal self-injury, Self-esteem, Regulatory emotional self-efficacy, Middle school students

Introduction

Non-suicidal self-injury (NSSI) has become one of the most significant mental health problems among middle school students and a growing societal concern. It is defined as a behavior in which individuals intentionally, directly, and repeatedly harm their own body tissue through cuts, burns, and other injuries without suicidal intent [1]. Non-suicidal self-injury not only causes immediate harm to the body, but may also lead to permanent scarring and increase the risk of accidental life-threatening harm. Studies indicate that the global prevalence of non-suicidal self-injury ranges between 17% and 18% [2], with adolescents exhibiting the highest incidence rates. Approximately 22.9% of adolescents report at least one instance of non-suicidal self-injury [3]. In China, the prevalence of non-suicidal self-injury among adolescents is reported to be 26.9% [4], while rates among left-behind children in western regions reach a staggering 48% [5]. Therefore, investigating the underlying mechanism of non-suicidal self-injury is critical for safeguarding the mental health of middle school students, promoting a healthy family environment, and improving their behavioral management skills.

Non-suicidal self-injury is influenced by both internal physiological and psychological factors as well as external environmental factors [6]. Life events in particular

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are strongly associated with non-suicidal self-injury and effectively predict its occurrence [7]. According to the interpersonal/systems model [8, 9], non-suicidal self-injury stems from dysfunctional interactions between the individual and their environment. In other words, external environment context may intentionally or unintentionally facilitate or trigger non-suicidal self-injury. Families are the primary developmental environment for individual, and parent-child relationship represents the earliest and most influential bonds [10]. However, interparental conflict (IPC) is a common occurrence in family life and has a significant impact on the mental well-being of adolescents [11]. Interparental conflict is characterized by verbal disputes or nonverbal aggressive behaviors resulting from disagreements [12]. As middle school students transition into adolescence, their interpersonal relationships increasingly prioritize peer and teacher-student relationships, yet the interparental relationship continues to shape their psychological and behavioral development. Studies [13–15] have shown that interparental conflict is significantly and positively associated with a range of problematic psychological and behavioral issues in adolescents, including depression and aggression. Higher interparental conflict intensity correlates with increased adolescents non-suicidal self-injury engagement [16], with effect persisting up to one year later [17]. Based on this evidence, we hypothesize:

H1 Interparental conflict positively predicts non-suicidal self-injury in middle school students.

Regarding the context of interparental conflict, current research has explored various factors to explain the occurrence of non-suicidal self-injury, with a greater emphasis on the mediating role of middle school students' emotional experiences. Less attention has been given to alterations to their self-structure due to exposure to interparental conflict. In response to interparental conflict, adolescents may experience negative emotional outcomes such as emotional insecurity or depression, which can contribute to non-suicidal self-injury [16, 17]. Despite this, previous research has not thoroughly explored the impact of interparental conflict on adolescent self-esteem (SE), a key dimension of personality, or the potential mediating role of self-esteem in the association between interparental conflict and non-suicidal self-injury. Thus, this study aims to provide additional clarity on how interparental conflict impacts non-suicidal self-injury through the self-esteem component of the personality's regulatory structure.

Self-esteem refers to an individual's subjective evaluation of their worth as a person, involving feelings of self-acceptance and self-respect [18, 19]. It has been linked to numerous positive consequences, including improved mental and physical health, as well as reduced antisocial behavior [20]. However, it is also vulnerable to adverse events. Previous study [15] has found that a significant negative correlation between interparental conflict and self-esteem, as prolonged exposure to such conflict may induce feelings of threat and subsequently lower self-esteem. Additionally, self-esteem is a significant predictor of self-injury. Based on the self-punishment theory of non-suicidal self-injury [21], individuals engage in self-harm to punish themselves and alleviate psychological distress stemming from low self-esteem and self-loathing [22] caused by negative family relationships, particularly interparental conflict. This behavior may serve as an attempt to restore inner balance [23]. Some studies [24–26] have also demonstrated a significant negative correlation between self-esteem and non-suicidal self-injury; the lower one's self-esteem, the greater the likelihood of engaging in non-suicidal self-injury. Therefore, the present study posits the following hypothesis:

H2 Self-esteem plays a mediating role in the influence of interparental conflict on non-suicidal self-injury in middle school students.

It is important to note that not all adolescents who experience interparental conflict will develop non-suicidal self-injury. According to the individual-environment interaction model [27], individual behavior is influenced by a complex interplay between intrinsic psychological traits and environmental factors, which can moderate environmental effects on behavior. Therefore, the effect of interparental conflict on non-suicidal self-injury in middle school students may be moderated by an inherent psychological attribute. Regulatory emotional self-efficacy (RESE), a psychological trait critical for managing emotions in interpersonal contexts, refer to an individual's perceived ability to regulate emotions, including self-efficacy for expressing positive emotions and managing negative emotions [28]. Previous studies [16, 29] have illustrated that there exists a significant inverse correlation between regulatory emotional self-efficacy and non-suicidal self-injury, suggesting that individuals with higher regulatory emotional self-efficacy are better equipped to employ effective strategies for managing negative emotions, thereby reducing non-suicidal self-injury.

On the other hand, self-esteem is intricately linked to emotional dysregulation [30] and regulatory emotional self-efficacy in adolescents. Research indicates that individuals with low self-esteem will experience more negative emotions when facing more adverse life events like interparental conflict, for example, low self-esteem is associated lower levels of life satisfaction and increased to anxiety and depression [11, 31, 32]. Regulatory emotional self-efficacy theory posits that [33]; regulatory emotional self-efficacy is closely related to an individual's

emotions. Specifically, some studies [34–36] have shown that individuals with high regulatory emotional self-efficacy can manage negative emotions well and have high self-esteem, exhibiting a significant positive correlation. On this basis, the present study proposes the following hypothesis:

H3 Regulatory emotional self-efficacy may moderate the relationship between self-esteem and non-suicidal self-injury.

Therefore, this study tests three hypotheses, integrating concepts from non-suicidal self-injury theory, the interpersonal or systemic model, the self-punishment model, and the individual-environment interaction model.

Methods

Participants

This was an independent cross-sectional study, and data were collected using the convenience sampling. Questionnaires were distributed to middle schools **i**n Anhui Province, China through a website link. Before the investigation, the teachers responsible for mental health educators from participating schools received training to clarify the study's purpose and procedure. The study was approved of the middle school. The survey was administered at the class level. The students who participated in the survey were volunteers and did not have any disability or diagnosed mental disorder. The students completed the online survey by visiting the website link of the questionnaire during computer classes.

In this study, the sample size was determined calculated using Wu [37] (2023) sample size formula, targeting $N > 1000$. Initially, 1121 questionnaires were distributed and 1072 valid responses were collected, with a validity rate of 95.6%. Among the participants, 563 (52.5%) were male and 509 (47.5%) were female. Additionally, 516 (48.1%) were junior high school students and 556 (51.9%) were senior high school students. The age range of participants was 12 to 19 years with mean range of 15.98 ± 1.22 years.

Measures

The children's perception of interparental conflict scale (CPIC)–Chinese version

The Children's Perception of Interparental Conflict Scale, developed by Grych et al. [38] and later revised by Zhao [39], was utilized as the research instrument. The scale comprises 18 items, including statements such as "I have never witnessed my parents argue or disagree." A 5-point rating scale is used, with 1 indicating "completely inconsistent" and 5 indicating "completely consistent." Higher total scores indicate more severe interparental conflict. The reliability and validity of the scale were assessed among Chinese middle school students, the results indicated that Cronbach's α for this scale was 0.88 [16], demonstrating satisfactory internal consistency. Additionally, the internal consistency coefficient of the questionnaire employed in this study was 0.93, further corroborating its reliability.

Self-esteem scale–Chinese version

The Self-esteem Scale developed by Rosenberg [40], revised by Wang et al. [41], was used in its Chinese version. The questionnaire includes 10 items, such as "I believe that I am valuable, as valuable as others," and it is rated on a four-point scale, with 1 representing "strongly disagree" and 4 representing "strongly agree." Self-esteem levels were measured as higher scores corresponded to greater levels of self-esteem. It has also been reported that the Cronbach's α of this scale was 0.82 in Chinese adolescents [26]. The internal consistency coefficient for the questionnaire in this study was 0.85.

Regulatory emotional self-efficacy scale–Chinese version

The Regulatory Emotional Self-efficacy scale, which was originally developed by Caprara et al. [42] and revised by Wang et al. [43], was utilized in this study. The scale comprises of 17 items, such as "I am capable of controlling my anger," and is divided into two separate domains: perceived self-efficacy for expressing positive emotions and self-efficacy for regulating negative emotions. A 5-point rating system is used for each item, with 1 representing "very inconsistent" and 5 representing "very consistent". A higher score indicates a higher level of regulatory emotional self-efficacy. The internal consistency of the scale was 0.88, according to a study by Wang et al. on Chinese middle school students [16]. The Cronbach's α of the scale in the current research was 0.94.

Adolescent self-injury questionnaire–Chinese version

The revised Adolescent Self-Injury Questionnaire (ASIQ) by Feng, Y. (2008) [44] was utilized. The questionnaire comprised of 18 items (e.g. "deliberately abrading skin with glass, knife, etc.") and an open-ended inquiry about self-harming behaviors such as cutting, burning, stabbing, scratching, head banging, hair-pulling, hitting hard objects, and instigating others to self-injury among others. The questionnaire comprised of two sections: self-injury frequency and extent of physical harm. Self-injury frequency was evaluated on a four-point scale, with 1 indicating "0 times," 2 indicating "1 time," 3 indicating "2–4 times," and 4 indicating "more than 5 times." The extent of physical harm was assessed on a five-point scale, with 1 indicating "none," 2 indicating "mild," 3 indicating "moderate," 4 indicating "severe," and 5 indicating "extreme." The total self-injury score was the sum of the products of the two sections, with higher scores corresponding to more severe self-injury. The ASIQ has been

Table 1 Descriptive statistics and correlation between variables

	M	SD	1	2	3	4
1. IPC	2.61	0.75	1			
2. SE	2.73	0.50	-0.35***	1		
3. RESE	3.41	0.73	-0.40***	0.60***	1	
4. NSSI	1.42	1.06	0.21***	-0.33***	-0.29***	1

Note: $N = 1072$; ***$p < 0.001$; Interparental Conflict = IPC; Self-esteem = SE; Regulatory emotional self-efficacy = RESE; Non-suicidal self-injury = NSSI

Table 2 Test of the mediation role of self-esteem in the relationship between interparental conflict and Non-suicidal self-injury

	Effect size	Boot SE	Boot LLCI	Boot ULCI	Ratio
Total effect	0.23	0.03	0.17	0.29	
Direct effect: IPC-NSSI	0.13	0.03	0.07	0.19	56.52%
Indirect effect: IPC-SE-NSSI	0.10	0.02	0.07	0.13	43.48%

Note: $N = 1072$; Interparental Conflict = IPC; Self-esteem = SE; Non-suicidal self-injury = NSSI

proven to have good reliability and validity, and the Cronbach's α of this scale was 0.85 in Chinese middle school students [17]. In this study, the questionnaire demonstrated strong internal consistency (Cronbach's α = 0.89).

Results

Common method bias

Harman's one-way analysis of variance was conducted to test for the presence of common method variance. The analysis revealed 16 factors with a characteristic root greater than 1. The first factor accounted for 23.68% of the variance, which was less than the threshold of 40%. This suggests that there was no significant common method bias present in the study.

Descriptive statistics and correlational analysis

As shown in Table 1, there was a statistically significant positive correlation between interparental conflict and non-suicidal self-injury. Interparental conflict was negatively correlated with self-esteem and regulatory emotional self-efficacy. Self-esteem was positively correlated with regulatory emotional self-efficacy and negatively correlated with non-suicidal self-injury. Regulatory emotional self-efficacy and non-suicidal self-injury were negatively correlated.

Test of the mediating effect of self-esteem

Model 4 of PROCESS was utilized to examine the mediating role of self-esteem in the relationship between interparental conflict and non-suicidal self-injury. As shown in Table 2, after controlling for variables such as gender, age and educational stage, the 95% confidence interval for the direct effect of interparental conflict on non-suicidal self-injury was [0.07, 0.19] with an effect size was 0.13. Similarly, the 95% of confidence interval for the mediating role of self-esteem was [0.07, 0.13] with an effect size was 0.10. Both the direct and mediated effects were statistically significant, with the indirect effect accounted for 43.48% of the total effect and the direct effect accounted for 56.52%.

Test of the moderating role of regulatory emotional self-efficacy on the mediating effect of self-esteem

The moderating effects of regulatory emotional self-efficacy were analyzed using Model 59 of the SPSS 27 macro PROCESS. Age, gender and educational stage were controlled and predictor variables were standardized to assess the moderated mediation model. Table 3 indicates that interparental conflict showed a positive correlation with non-suicidal self-injury and a negative

Table 3 Results of moderated meditation analysis for Non-suicidal self-injury

	Model 1			Model 2			Model 3		
	Non-suicidal self-injury			Self-esteem			Non-suicidal self-injury		
	B	SE	t	B	SE	t	B	SE	t
Gender	-0.11	0.06	-1.94	-0.02	0.05	-0.33	-0.12*	0.06	-2.20*
Age	-0.17***	0.03	-4.91***	0.06*	0.03	2.27*	-0.13***	0.03	-4.09***
Educational stage	-0.05	0.08	-0.57	0.12	0.07	1.70	-0.01	0.08	-0.10
IPC	0.23***	0.03	7.75***	-0.13***	0.03	-4.96***	0.11***	0.03	3.60***
RESE				0.54***	0.03	20.42***	-0.13***	0.04	-3.71***
IPC* RESE				-0.005	0.02	-0.21	-0.05	0.03	-1.70
SE							-0.21***	0.04	-6.06***
SE*RESE							0.10***	0.03	3.91***
R^2	0.08			0.38			0.18		
F	24.66***			108.14***			29.65***		

Note: $N = 1072$; *$p < 0.05$, ***$p < 0.001$; Interparental Conflict = IPC; Self-esteem = SE; Regulatory emotional self-efficacy = RESE; Non-suicidal self-injury = NSSI

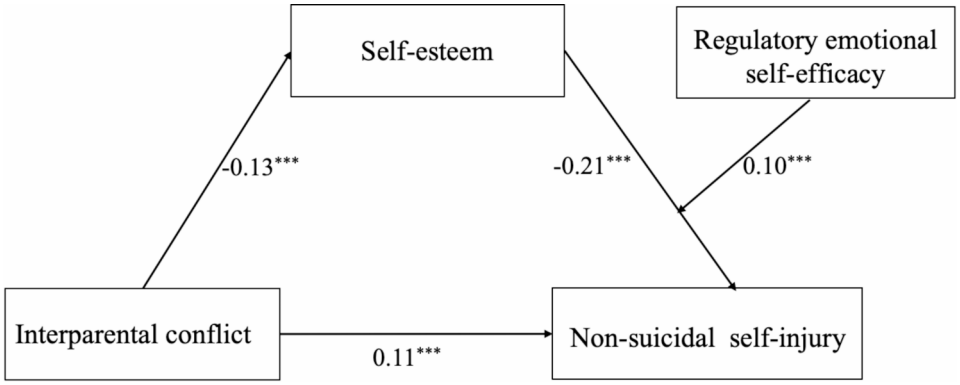

Fig. 1 The mediated moderation model

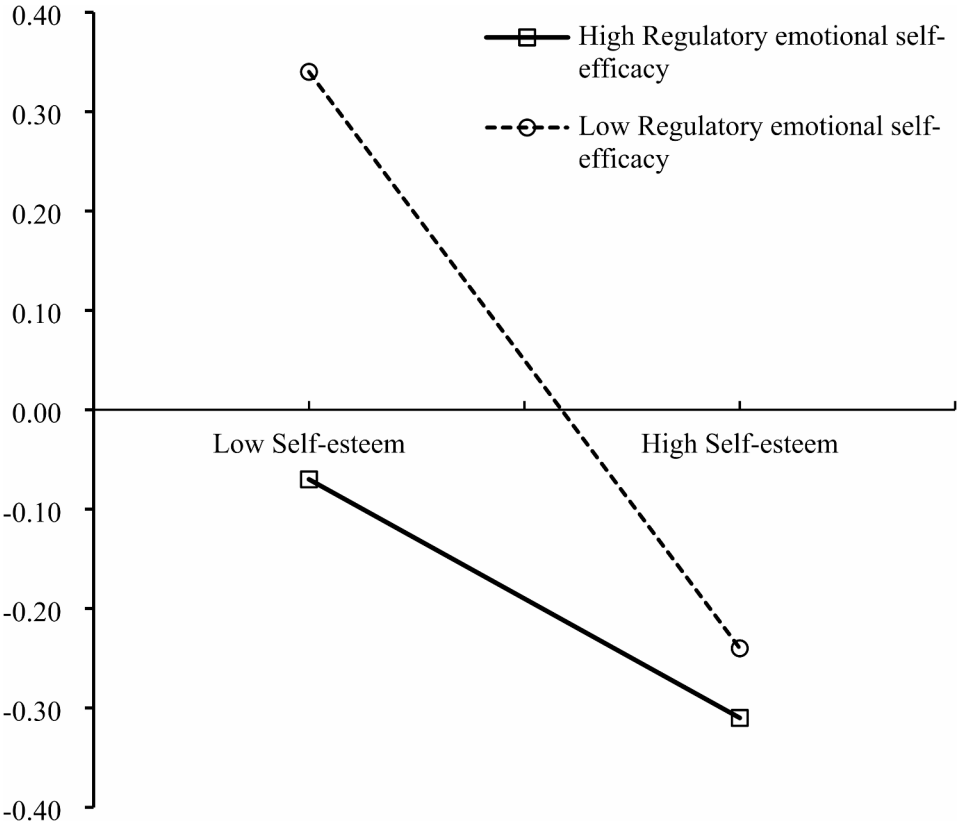

Fig. 2 Simple slope analysis (Standardize)

correlation with self-esteem. However, after including regulatory emotional self-efficacy in the model, only the negative correlation between self-esteem and non-suicidal self-injury remained significant, indicating that regulatory emotional self-efficacy moderated the relationship between self-esteem and non-suicidal self-injury ($\beta = 0.10$, t = 3.91, $p < 0.001$). Specifically, regulatory emotional self-efficacy moderated the negative predictive effect of self-esteem on non-suicidal self-injury. This suggests that enhancing regulatory emotional self-efficacy can mitigate the negative impact of low self-esteem on non-suicidal self-injury. Figure 1 provides a visual representation of the moderated mediation process. Overall, the findings highlight the importance of addressing regulatory emotional self-efficacy in non-suicidal self-injury prevention and intervention.

To elucidate the moderating role of regulatory emotional self-efficacy in the mediating effect of self-esteem on non-suicidal self-injury, we classified regulatory emotional self-efficacy as high or low based on the mean plus or minus one standard deviation. Simple slope analysis and effect analysis plots were conducted (see Fig. 2) to investigate the impact of self-esteem on non-suicidal self-injury at different levels of regulatory emotional

self-efficacy. Our findings demonstrate that self-esteem significantly predicts lower rates of non-suicidal self-injury among middle school students, irrespective of their level of regulatory emotional self-efficacy. Simple slope analyses revealed a stronger negative association in the low regulatory emotional self-efficacy group (βsimple = -0.31, t = -7.22, $p < 0.001$) compared to the high regulatory emotional self-efficacy group (βsimple = -0.11, t = -2.60, $p < 0.01$), indicating that the predictive effect of self-esteem on NSSI attenuates with higher levels of regulatory emotional self-efficacy.

Discussion

The present study aims to investigate the relationships between interparental conflict and non-suicidal self-injury behaviors among middle school students, both directly and indirectly. A representative sample from China was utilized to develop a moderated mediation model to explore the mediating role of self-esteem and the moderating role of regulatory emotional self-efficacy in this relationship. Overall, the results of this study support the proposed model and demonstrate the effects of interparental conflict on non-suicidal self-injury behaviors in middle school students. More detailed explanations are provided in the following section.

This study confirms Hypothesis 1, which suggests that there is a positive correlation between interparental conflict and non-suicidal self-injury in middle school students. The greater the frequency and intensity of interparental conflict, the higher the level of non-suicidal self-injury among middle school students, which is consistent with the research of Wang et al. (2016) [l6] and Chen, H. (2021) [17]. The interpersonal/relational system model can explain this phenomenon [18]. This theory suggests that verbal or physical aggression and arguments between parents can create a less warm family environment, which in turn creates family dysfunction [16], leading adolescents to respond to family insecurities with non-suicidal self-injury while feeling pain from negative interpersonal relations [1].

The results of this study also confirmed Hypothesis 2, which posits the mediating role of self-esteem, and revealed that interparental conflict decreases the level of self-esteem in middle school students, and the decrease in self-esteem level induces non-suicidal self-injury in middle school students. This result is consistent with the studies that interparental conflict negatively predicts self-esteem [15] and self-esteem negatively predicts non-suicidal self-injury [45]. Meanwhile, the results of this study also supported the self-punishment theory of non-suicidal self-injury [21, 46, 47], suggesting that self-punishment serves as a crucial function of non-suicidal self-injury. In essence, people engage in non-suicidal self-injury in order to punish themselves as a way to reduce the internal stress caused by shame, guilt, and other negative emotions. Therefore, middle school students who have faced interparental conflict for a long time and whose physical and mental development is not balanced, lack sufficient self-evaluation and emotion management ability to cope with low self-esteem caused by interparental conflict, and therefore, the easier it is to produce negative emotions such as shame and guilt, which induces individuals to punish themselves through non-suicidal self-injury to achieve the goal of alleviating the effects of negative emotions [26].

The current study provides support for Hypothesis 3, which suggests that regulatory emotional self-efficacy may moderate the relationship between self-esteem and non-suicidal self-injury. Specifically, compared to middle school students with high regulatory emotional self-efficacy, those with low regulatory emotional self-efficacy are more susceptible to the effects of low self-esteem induced by interparental conflict and more likely to engage in non-suicidal self-injury. In other words, regulatory emotional self-efficacy can help reduce the likelihood of non-suicidal self-injury [48, 49]. This supports the of individual-environment interaction [27], where regulatory emotional self-efficacy act as a protective traits influence the connection between their actions and their external surroundings. When middle school students are exposed to interparental conflict, their inherent ability to regulate their emotions acts as a safeguard against the link between their emotional instability and their conduct [50], ultimately decreases the likelihood of non-suicidal self-injury. Moreover, in line with the regulatory emotional self-efficacy model proposed by Bandura et al. in 1999 [28], non-suicidal self-injury among adolescents is influenced by the level of regulatory emotional self-efficacy. This finding has been consistently supported by previous studies [16, 29], which have demonstrated a significant negative correlation between regulatory emotional self-efficacy and non-suicidal self-injury in adolescents. Middle school students who exhibit higher levels of regulatory emotional self-efficacy are better able to cope with stress and regulate their emotions, leading to enhanced self-esteem and a decrease in non-suicidal self-injury.

Implications and limitations

Based on basis of previous studies and the above theories, this study reveals the internal mechanism of interparental conflict affecting middle school students' non-suicidal self-injury through a moderated mediation model. This study not only enriches research on non-suicidal self-injury in Chinese middle school students, but also validates the influence of interparental conflict and highlights the role of cumulative family risk factors, such as family conflict [16, 51]. In addition, the

practical significance of this study is to provide psychological guidance and suggestions for school educators and family educators to prevent and reduce non-suicidal self-injury. On the one hand, research has revealed that adverse life experiences are a significant predictor of non-suicidal self-injury in the middle school setting [52, 53]. As such, cultivating a supportive and nurturing home environment that provides ample emotional security and satisfaction, and strengthening family bonds, can effectively curtail instances of non-suicidal self-injury among middle school students. On the other hand, educators can enhance self-esteem in middle school students by teaching positive cognitive appraisal techniques [54], using cognitive behavioral therapy and narrative therapy approaches [55], teaching emotion management strategies, and improving emotion management skills. By strengthening their regulatory emotional self-efficacy, educators can effectively reduce negative emotional effects and prevent non-suicidal self-injury among middle school students [56].

However, this study has some limitations. First, a cross-sectional study was designed in this study, which did not examine a longitudinal effect of interparental conflict on non-suicidal self-injury. Future studies could employ a longitudinal study design to explore the effects of interparental relationship changes on non-suicidal self-injury behavior over time. Second, the data were collected from self-reports of the participants, which may introduce potential bias. In the future, researchers could combine these self-report with multimodal methods to improve the reliability of the data. Third, the subject selection focused solely on urban middle school students, with no involvement of rural middle school students. This demographic bias could have affected the study's results. Future research should compare how interparental conflict impacts urban and rural middle school students differently. Finally, this study focused solely on examining the role of regulatory emotional self-efficacy, a homogeneous psychological factor, in the relationship between interparental conflict and non-suicidal self-injury. However, it overlooked the fact that other cognitive factors may also moderate this relationship. Future research could integrate the self-efficacy to resist non-suicidal self-injury and the outcome of non-suicidal self-injury expectancy efficacy [57] with regulatory emotional self-efficacy to unravel the underlying mechanisms of interparental conflict and non-suicidal self-injury.

Conclusion

This is the first study to construct a moderated mediation model to explore the mechanisms underlying the effect of interparental conflict on non-suicidal self-injury among Chinese middle school students. The model demonstrated that interparental conflict significantly and positively predicted non-suicidal self-injury. Additionally, the study found that self-esteem served as a mediator between interparental conflict and non-suicidal self-injury. Furthermore, the study revealed that regulatory emotional self-efficacy moderates the mediating effect of self-esteem. Specifically, higher levels of regulatory emotional self-efficacy results weaken the mediating effect of self-esteem on the interparental conflict and non-suicidal self-injury relationship.

Abbreviations

IPC	Interparental conflict
NSSI	Non-suicidal self-injury
SE	Self-esteem
RESE	Regulatory emotional self-efficacy
CPIC	Children's Perception of Interparental Conflict Scale
ASIQ	Adolescent Self-Injury Questionnaire

Author contributions

Zhendong Wan: Conceptualization, Methodology, Investigation, Data collection, Data Curation, Formal analysis, Visualization, Writing-Original Draft, Writing-Review & Editing. Shuanghu Fang: Conceptualization, Methodology, Investigation, Data collection, Data Curation, Validation, Formal analysis, Visualization, Writing-Original Draft, Writing-Review & Editing. Chunni Zhao: Investigation, Formal analysis, Writing-Original Draft. All authors contributed to the article and approved the submitted version.

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Data availability

The datasets used and/or analyzed during the current study are available from the first author upon reasonable request.

Declarations

Ethics approval and consent to participate

All the methods were performed in accordance with the Declaration of Helsinki. All procedures performed in studies involving human participants were in accordance with ethical standards of the Ethical Committee of Anhui Normal University. All the participants provided informed consent. Participants under the age of 16 received informed consent from a parent or guardian.

Consent to publish

Not applicable.

Competing interests

The authors declare no competing interests.

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