

RESEARCH ARTICLE

Mediating effects of child schema mode in the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior in college students

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ABSTRACT

This study was aimed to investigate the psychological mechanisms underlying non-suicidal self-injurious behavior. For this purpose, we hypothesized that dysfunctional child modes act as a psychological mechanism to influence the relationship between negative parent-child relationships in childhood and current cognitions (catastrophizing), emotions (emotional dysregulation and depression), and behaviors (non-suicidal self-injurious behaviors). A sample of 430 college students (male 97, female 333) with experience of non-suicidal self-injurious behavior was selected to test the multi-mediation effects of child schema mode (angry, impulsive), catastrophizing, emotional dysregulation, and depression on the relationship between negative parent-child relationships in childhood and non-suicidal self-injury. As a result of structural equation modeling analysis, it was found that negative parent-child relationships in childhood directly influenced child schema mode, catastrophizing, depression, and non-suicidal self-injurious behaviors. In addition, it was found that negative parent-child relationships in childhood were dually mediated by child schema mode and depression and child schema mode and emotional dysregulation. The present study highlights the mediating role of child schema modes as a psychological mechanism underlying the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior. Based on these findings, the usefulness and direction of schema therapy interventions in the field of non-suicidal self-injury counseling are discussed.

Keywords: non-suicidal self-injurious behavior; child schema mode; catastrophizing; emotional dysregulation; depression; negative parent-child relationships in childhood; schema therapy

1. Introduction

Non-suicidal self-injury (NSSI) is the intentional damage to one's own body tissues without the intent to die [1] and is distinguished from suicide by qualitative differences in intensity and method [2]. Non-suicidal self-injury prevalence is 17.2% in adolescents and 13.4% in young adults compared to 5.5% for adults in other age groups [3]. Other studies have found prevalence rates as high as 37.2% for non-suicidal self-injury in middle school youth [4] and over 20% for early adulthood [5].

In a study of Korean adolescents [6], the prevalence of non-suicidal self-injury was 22.8%, and the

ARTICLE INFO

Received: 30 August 2024 | Accepted: 10 October 2024 | Available online: 21 October 2024

CITATION

Bang S.K, Lee E. Mediating effects of child schema mode in the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior in college students. *Environment and Social Psychology* 2024; 9(9): 3064. doi:10.59429/esp.v9i9.3064

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earlier the onset, the higher the frequency of non-suicidal self-injury. In recent years, the rate of non-suicidal self-injury and suicide attempts among Korean teenagers has been increasing from 30.8% in 2012 to 46.2% in 2022 [7]. However, as only about 50% of adolescents who engage in non-suicidal self-injurious behaviors disclose their behaviors to others [8] and most parents are unaware of their children's non-suicidal self-injurious behaviors [9], it is expected that the actual number of adolescents who have experienced non-suicidal self-injury is higher than the identified prevalence of non-suicidal self-injury.

Negative parent-child relationships have been linked to non-suicidal self-injury, including alienation from parents [10, 11], parental blame [12, 10], negative emotional environment [13], and lack of parental support [14]. Children can experience relational trauma with their families, and relational trauma is characterized by the near simultaneous occurrence of maltreatment and an unfortunate family history. Family-related relational trauma affects non-suicidal self-injurious behavior beyond the effects of abuse or adverse family history on non-suicidal self-injury [15].

Among childhood maltreatment, emotional abuse negatively affects people regardless of age and socioeconomic status [16] and is associated with more severe emotional, behavioral, and psychological problems than other types of maltreatment [17]. Emotional abuse can lead to deficits in self-soothing skills and impulse control, which can increase the risk of self-injury [18], and children who experience emotional abuse may experience psychological difficulties in adulthood [19].

Cognitive emotion regulation is a cognitive way of taking in and regulating emotionally charged information [20], and cognitive emotion regulation is associated with self-blame, other-blame, acceptance, positive refocusing, catastrophizing, and positive reappraisal [21]. Among cognitive emotion regulation, catastrophizing thoughts, which are thoughts that explicitly emphasize the fearfulness of an experience, are associated with emotional distress, depression, and maladaptation [22] and affect other cognitive structures [23]. As such, catastrophizing can lead to emotional and behavioral disturbances [24], including depression [25-30] as well as anxiety [25, 31-35].

Depressive symptoms in adolescence are 2-4 times more likely to become chronic and persist into adulthood [36] and negatively impact quality of life and satisfaction [37]. Depression in adolescents is strongly associated with socio-environmental factors rather than biological factors [38]. Among environmental factors, family-related factors are important and influence the extent and severity of depression in adolescents [39]. Family-based factors such as family cohesion, family psychological relationships [40], relationships with parents [41], parental attachment [42], parental social support [43], and parental conflict [44] are particularly influential in adolescent depressive symptoms.

Depressive symptoms in adolescents can predict non-suicidal self-injurious behaviors and have been shown to be associated with non-suicidal self-injurious behaviors [45, 46]. During early adulthood, the transition from adolescence to adulthood, college students face an expanded social context, both academically and interpersonally [47]. However, this is also a time of increased risk for psychiatric disorders and risky behaviors [48, 49], and early adulthood is characterized by psychological instability similar to adolescence [50]. Previous research among college students has also found that family relationships are associated with depression [51], and failure to establish a sense of identity within the family is associated with depression and suicidal ideation [52].

Schema Therapy proposes that psychological symptoms, disorders, and problems are caused by the development of maladaptive schemas due to the unmet core childhood needs, such as attachment, in the childhood environment, along with the child's temperament, and that schema modes are triggered when maladaptive schemas are activated [53]. There are four basic categories of schema modes: innate child modes,

dysfunctional criticizing modes, maladaptive coping modes, and healthy modes. Innate child modes emerge when core needs are not adequately met, and depending on the unmet core needs, sub-child modes such as vulnerable child mode, angry child mode, impulsive child mode, and undisciplined mode develop. When an individual is in child mode, emotions are dominant. Dysfunctional criticizing modes are selective internalizations of negative aspects of significant attachment figures, with dysfunctional criticizing modes including the punitive criticizing mode, an inner voice that blames and punishes the self, and the demanding criticizing mode, which sets unreasonably high standards for the self and forces the self to meet those standards. When an individual is in dysfunctional criticizing modes, thinking, which is a negative 'voice in his head', is dominant. maladaptive coping modes are the overuse of survival-based interpersonal coping responses based on early childhood experiences and can be categorized into the following sub-modes: overcompensator, avoidant, and compliant surrender. Healthy modes include a healthy adult mode and a happy child mode, where a healthy adult mode is an adaptive self-regulating aspect of a competent and well-functioning self, and a happy child mode is a state of calm and contentment in which all of one's core emotional needs are currently met.

Very rapid shifts from one mode to another in schema therapy can create an imbalance that can lead to rapid behavioral changes, interpersonal difficulties, and emotional and behavioral instability in clients. Maladaptive schemas mediate between adverse childhood experiences and childhood psychopathology and serve as a mechanism between childhood psychopathology and adult psychopathology [54]. Personality disorders that require consideration of negative parent-child relationships in childhood, especially borderline personality disorder, were found to have high scores on all maladaptive schema modes [55]. Schema modes have been shown to mediate the relationship between childhood emotional abuse and the development of various personality disorders [56], the relationship between emotional abuse and personality difficulties in adulthood [57], and the relationship between schema modes and externalizing and internalizing behaviors [58].

Although schema modes have been and continue to be well studied in relation to personality disorders, there is little research on schema modes as a psychological mechanism underlying non-suicidal self-injurious behavior. Therefore, in the present study, we hypothesized that dysfunctional child modes are developed and expressed by negative parent-child relationships in childhood, which may act as an important mechanism for psychological maladaptation and maladaptive behavior, namely non-suicidal self-injurious behavior, either as a cause or mediator of psychological disorders.

Based on previous research, we expected that non-suicidal self-injurious behavior in adolescents would be closely related to mood. We expected that depression in adolescents would be associated with non-suicidal self-injurious behavior and that depression, a negative mood, would be associated with catastrophic thinking and emotional dysregulation. In other words, we expected that negative childhood experiences (emotional abuse, parental rejection, negative parent-child relationships) would influence the development of cognition (catastrophizing), which in turn would influence emotion (dysregulation, depression) and behavior (non-suicidal self-injury). Given that the prevalence of non-suicidal self-injury is consistently high in adolescence, and that non-suicidal self-injury can affect the mental health of adolescents throughout their lives, there is a strong need for better understanding, preventive approaches, and therapeutic interventions.

Therefore, in accordance with the etiological model of schema therapy, this study hypothesized that dysfunctional child modes act as a psychological mechanism to influence current cognitions, emotions, and behaviors (**Figure 1**). This study aimed to identify the psychological mechanism of non-suicidal self-injurious behavior based on the theory of schema therapy, i.e., to identify the role of dysfunctional childhood modes as a psychological mechanism in adolescents who experience non-suicidal self-injury.

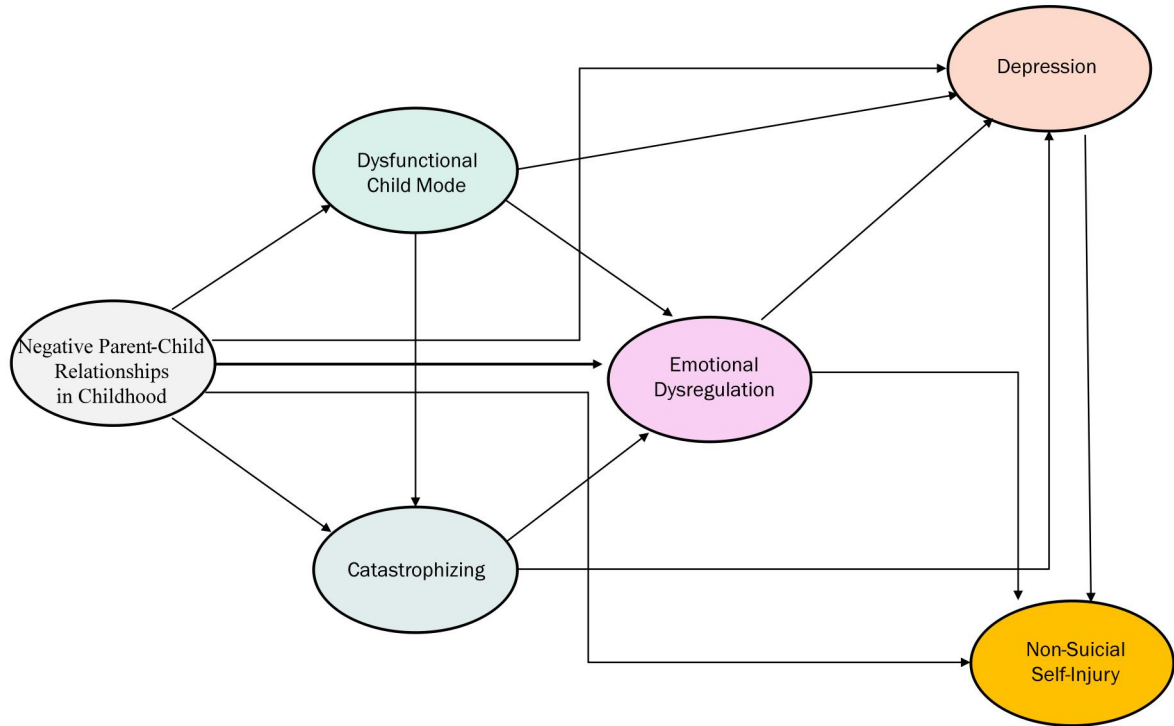


Figure 1. Hypothesized Model.

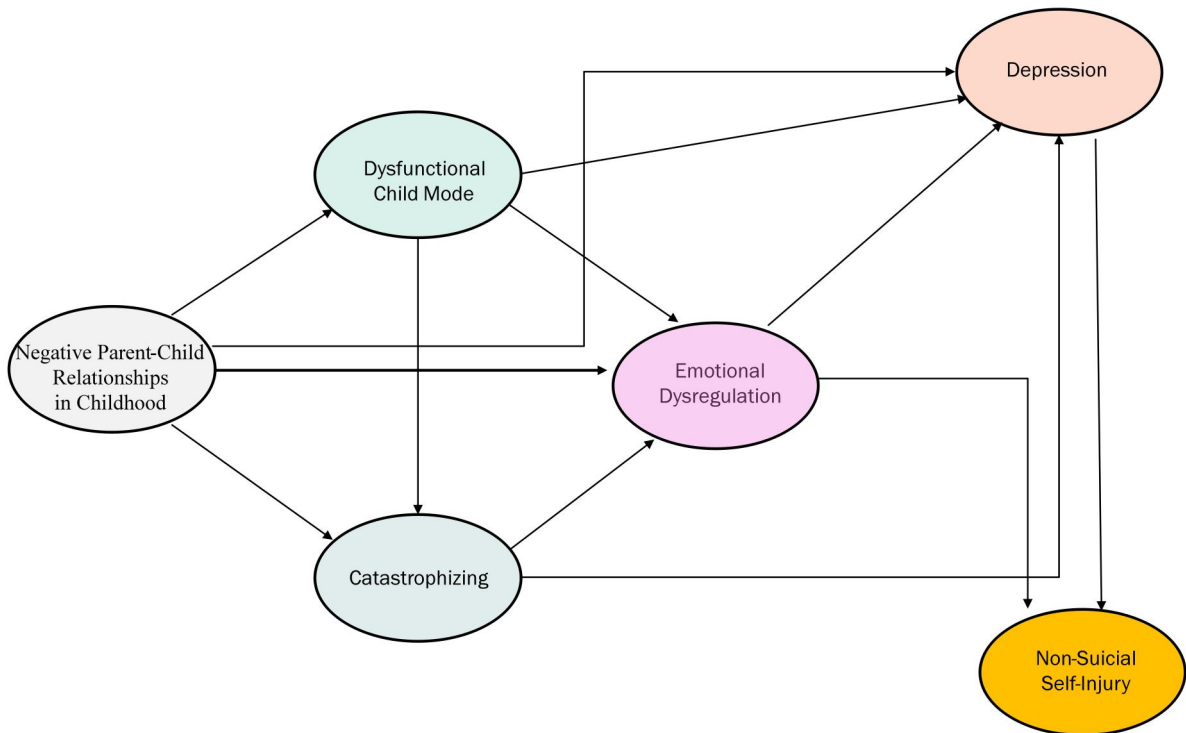


Figure 2. Competing Model.

2. Methods

2.1. Participants and procedure

The survey for this study was conducted between April 5 and April 20, 2023, among registered panelists through a research center with 1.3 million panelists. It was conducted among college students in their 20s with an experience of non-suicidal self-injury who agreed to participate in the study. In addition, two screening questions were prioritized to select participants. The screening questionnaire was the Functional Assessment of Self-Mutilation (FASM), which was used to check the frequency and method of self-injury experience and the presence or absence of non-suicidal self-injurious behaviors in the past year based on the diagnostic and statistical manual of mental disorders-fifth edition (DSM-5). The survey was administered to a panel of individuals who were willing to participate and who met the criteria defined by the two screening questions. Of the 8754 participants, 430 were finally selected and completed the survey (100%), and the results were used in this study. Participants were located throughout the country, with Seoul (30.9%) and Gyeonggi (25.3%) being the most common regions. There were 97 males (22.6%) and 333 females (77.4%) who had engaged in non-suicidal self-injurious behaviors in the past year, with a higher proportion of females. In terms of age, 57 (13.3%) were aged 18-19 and 373 (86.7%) were aged 20-29. Of these, 219 (50.9%) were between the ages of 21 and 23.

2.2. Measures

2.2.1. Childhood emotional abuse

The study utilized the Childhood Emotional Abuse Scale, a 4-point Likert scale developed by Ko ^[59]. This scale consists of questions about physical abuse, neglect, and emotional abuse. Only five emotional abuse items were used in this study. The internal consistency (Cronbach's α) for the emotional abuse scale in this study was .89.

2.2.2. Parental Acceptance-Rejection Questionnaire (PARQ)

The Korean version of the Parental Acceptance-Rejection Questionnaire (PARQ) developed by Kwon ^[60] was used to measure perceived parental rejection, which consists of a Likert-type 4-point scale developed by Rohner and Rohner ^[61]. The PARQ consists of 21 items, including accepting or rejecting attitudes such as 'He tells me good things about me' and 'He complains about me'. In this study, father and mother were used as parents, and a total of 7 items of parental rejection were used. The internal consistency of the perceived parental rejection scale in this study was .94.

2.2.3. Inventory of Parent and Peer Attachment (IPPA-R)

As a measure of perceived parent-child relationship trauma, we used the Inventory of Parent and Peer Attachment (IPPA), a Likert-type 5-point scale developed by Armsden and Greenberg ^[62], revised by Raja, MaGee, and Stanton ^[63] and adapted by Kim ^[64] (IPPA-R). The IPPA-R scale consists of three sub-factors: trust, communication, and alienation. Each sub-factor consists of 10 items: trust, 9 items: communication, and 6 items: alienation. In this study, 6 items from the alienation subscale were used as a measure of perceived parent-child relationship trauma. In this study, father and mother were used as parents, and the internal consistency of the Perceived Parent-Child Relationship Trauma Scale was .91.

2.2.4. Functional Assessment of Self-Mutilation Scale (FASM)

This study used the 10-item Korean version of the 7-point Likert-type Functional Assessment of Self-Mutilation (FASM) developed by Lloyd-Richardson, Kelley, and Hope ^[65], translated into Korean, and validated by Kwon and Kwon ^[66]. The internal consistency for FASM in this study was .75.

2.2.5. the Korean version of the Center for Epidemiologic Studies-Depression Scale (CES-D)

This study used 20 items with a 4-point Likert-type Korean version of the Center for Epidemiologic Studies-Depression Scale (CES-D), developed by Radloff^[67] and validated by Chon, Choi, and Yang^[68]. In this study, the internal consistency for CES-D was .93.

2.2.6. Catastrophizing Scale

This study used the Cognitive Emotion Regulation Questionnaire (CERQ), a 5-point Likert-type scale developed by Garnefski, Kraaij, and Spinhoven et al.^[21], and translated into Korean by Kim^[69]. There was only one catastrophizing factor (3 items) from the nine subfactors of the maladaptive cognitive emotion regulation strategies scale. The internal consistency of the catastrophizing scale in this study was .87.

2.2.7. K-Difficulties in Emotional Regulation Scale (K-DERS)

This study used the Difficulties in Emotional Regulation Scale (DERS), a Likert-type 5-point scale developed by Gratz and Roemer^[70], adapted and validated by Cho^[71], and selected only four of the six subfactors of the Korean version of the Difficulties in Emotional Regulation Scale (K-DERS): emotional intolerance, difficulty controlling impulses, limited access to emotion regulation strategies, and difficulty in goal-directed behavior, for a total of 12 items. The internal consistency of the emotional dysregulation scale in this study was .90.

2.2.8. Dysfunctional Child Mode

The shortened Korean version of the Schema Mode Inventory (SMI), a six-point Likert-type scale developed by Young et al.^[72], translated into Korean, and validated by Song and Lee^[73]. This study used the 5-item angry child mode and 5-item Impulsive child mode among the shortened Korean version of the Schema Mode Inventory 61 items. The internal consistency for angry child mode was .84, and Impulsive child mode was .87.

2.3. Statistical Analyses

We used PRELIS 2.80 to test the normal distribution of the study variables. In general, data is considered outside of normality if the absolute value of skewness is greater than 3.0 and the absolute value of kurtosis is greater than 10.0^[74]. The data analysis of this study confirmed that there were no outliers and that the skewness and kurtosis of all study variables' indicators did not violate the normality assumption, so the structural equation modeling analysis (LISREL 8.8) was estimated using the maximum likelihood method, which assumes the normality of the study variables. In the present study, because the use of summed items rather than individual items has been shown to improve psychometric properties and increase goodness of fit^[75], negative parent-child relationship in childhood scale was composed of three subscales (emotional abuse in childhood, parental rejection, and parent-child relationship trauma), the emotional regulation scale was composed of four subscales (emotional intolerance, difficulty controlling impulses, limited access to emotion regulation strategies, and difficulty in goal-directed behavior), and the catastrophizing, depression, and non-suicidal self-injurious behavior scales were composed of two subscales using item parceling techniques (ex, Bruch, Berko & Haase^[76]).

Item parceling is used because it can improve a variety of data problems, including non-normality, small sample sizes, small sample size-to-variable ratios, and unstable parameter estimates^[77]. Item parceling is a technique in which conceptually similar items or items that are psychometrically unidimensional are parceled together to measure the same construct^[78] and approximate a normal distribution more closely than individual items^[77]. There are several techniques for item parceling, including parceling through exploratory factor analysis^[79], parceling similar items^[80], parceling items randomly^[81], and parceling items by

considering the direction of skewness (negative or positive) [82], and in this study, two subscales were constructed by parceling through exploratory factor analysis.

To check the goodness of fit of the model, multiple statistics such as χ^2 , p-value for χ^2 , Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA) were used. For the fit indices, there is no absolute standard, but TLI and CFI are considered a good fit [84] with a value of .90 or higher, RMSEA is considered a good fit with a value of .05, good fit with a value of .05~.08, and poor fit with a value of .10 or higher [84].

To examine the relationships between negative childhood parent-child relationships in childhood, dysfunctional child schema mode, catastrophizing, emotional dysregulation, depression, and non-suicidal self-injurious behavior, we used LISREL 8.8 to conduct a structural equation model analysis. In addition, it is not advisable to modify the model to improve the fit when the research model is not a good fit, and it is recommended to test the competing models by pre-multimodeling [85]. Therefore, in this study, we hypothesized a partial mediation model (**Figure 1**) in which negative parent-child relationships in childhood have a direct effect on non-suicidal self-injurious behaviors and an indirect effect on non-suicidal self-injurious behaviors through each of the dysfunctional child schema modes, catastrophizing, emotional dysregulation, and depression. The full mediation model (**Figure 2**), in which a negative parent-child relationship in childhood does not directly affect non-suicidal self-injurious behaviors, but indirectly affects non-suicidal self-injurious behaviors through each dysfunctional child schema mode, catastrophic thinking, emotional dysregulation, and depression, was set as a competing model. The hypotheses of the structural equation model of the present study are presented in **Figure 3**.

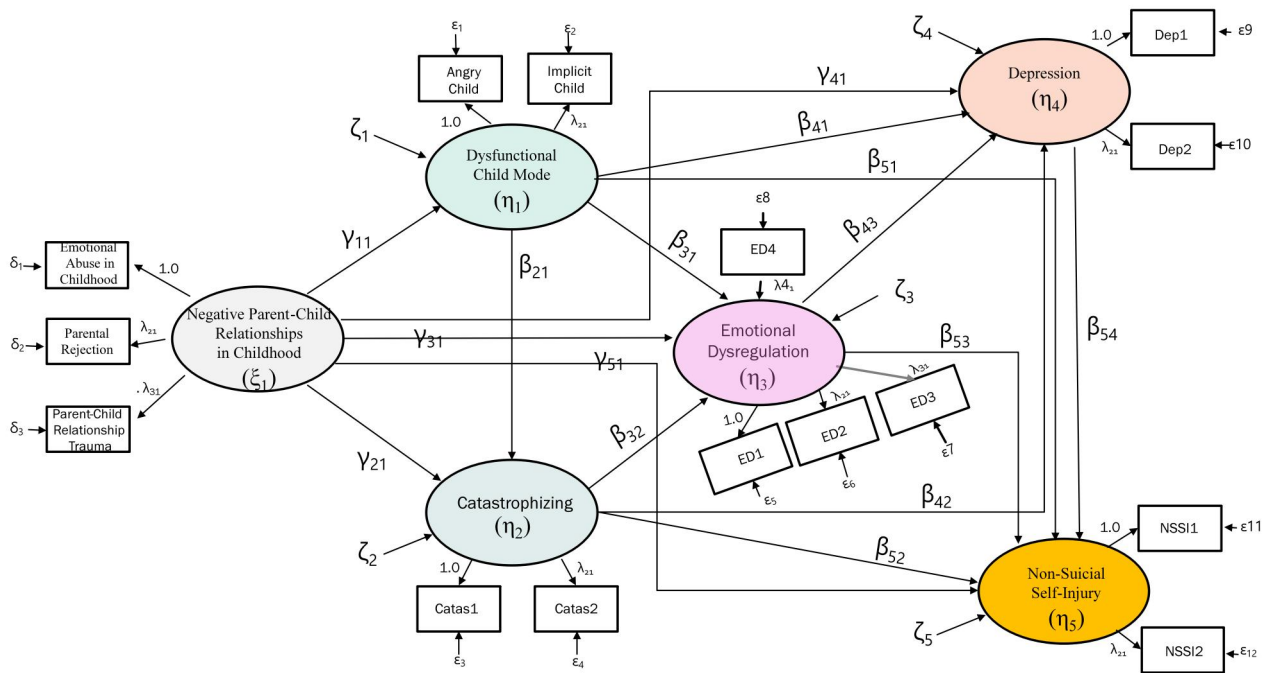


Figure 3. Structural Equation Model of the Hypothesized Model.

3. Results

Means, standard deviations, and correlations among the measured variables are presented in **Table 1**. The measured variables demonstrated moderate, statistically significant correlations in line with the study's hypotheses and the kurtosis and skewness suggest that the data are normally distributed.

Table 1. Pearson Correlations Among and Descriptive Statistics for Study Variables.

Variable	1	2	3	4	5	6
1. Non-Suicidal Self-Injury	—					
2. Negative Relationships	.36**	—				
3. Dysfunctional Child Mode	.33**	.54**	—			
4. Catastrophizing	.35**	.58**	.66**	—		
5. Emotional Dysregulation	.36**	.44**	.68**	.60**	—	
6. Depression	.42**	.55**	.62**	.66**	.58**	—
Mean	17.10	41.71	30.00	10.83	38.57	29.09
SD	11.16	18.56	11.31	4.72	9.65	13.32
Skewness	.92	.48	.11	.08	-.32	.20
Kurtosis	.13	-.85	-.73	1.15	-.32	-.72

Note: Negative Relationship = Negative Parent-Child Relationships in Childhood. * $p < .05$. ** $p < .01$.

3.1. Model fit

The model fit indices for the hypothesized model of the present study, in which negative parent-child relationships in childhood directly influence non-suicidal self-injurious behavior and indirectly influence non-suicidal self-injurious behavior through the multiple mediators of dysfunctional child style, catastrophizing, emotional dysregulation, and depression, is presented in **Table 2**. Inspection of the fit statistics for this study reveals that hypothesized model proved to be very acceptable [$\chi^2 (75, N = 430) = 232.60, p < .01, NFI = .976, TLI = .977, CFI = .984, RMSEA = .070$].

Table 2. Goodness of fit of the hypothesized model.

χ^2	df	p	NFI	TLI	CFI	RMSEA
232.60	75	<.001	.976	.977	.984	.070

3.2. Model comparison

We examined two models: a partial mediation model in which negative parent-child relationships in childhood directly influenced non-suicidal self-injurious behavior and indirectly influenced non-suicidal self-injurious behavior through the multiple mediators of dysfunctional child mode, catastrophizing, emotional dysregulation, and depression; and a competing model in which negative parent-child relationships in childhood did not directly influence depression and non-suicidal self-injurious behavior and indirectly influenced non-suicidal self-injurious behavior through the multiple mediators of dysfunctional child mode, catastrophizing, emotional dysregulation, and depression. The results of comparing the fit of the hypothesized model to the competing models are presented in **Table 3**. The χ^2 difference test between the hypothesized model and the competing model shows a significant difference [$\Delta\chi^2 = 4.20, \Delta df = 1, p < .05$], so the hypothesized model is the better model.

Table 3. Goodness of fit of the hypothesized model and competing model.

Model	χ^2	df	p	NFI	TLI	CFI	RMSEA
Hypothesized Model	228.98	75	<.01	.976	.977	.984	.069
Competing Model	233.18	76	<.01	.976	.977	.983	.069

3.3. Model analysis

The results of the structural equation model analysis of the hypothesized model of this study are presented in **Figure 4**.

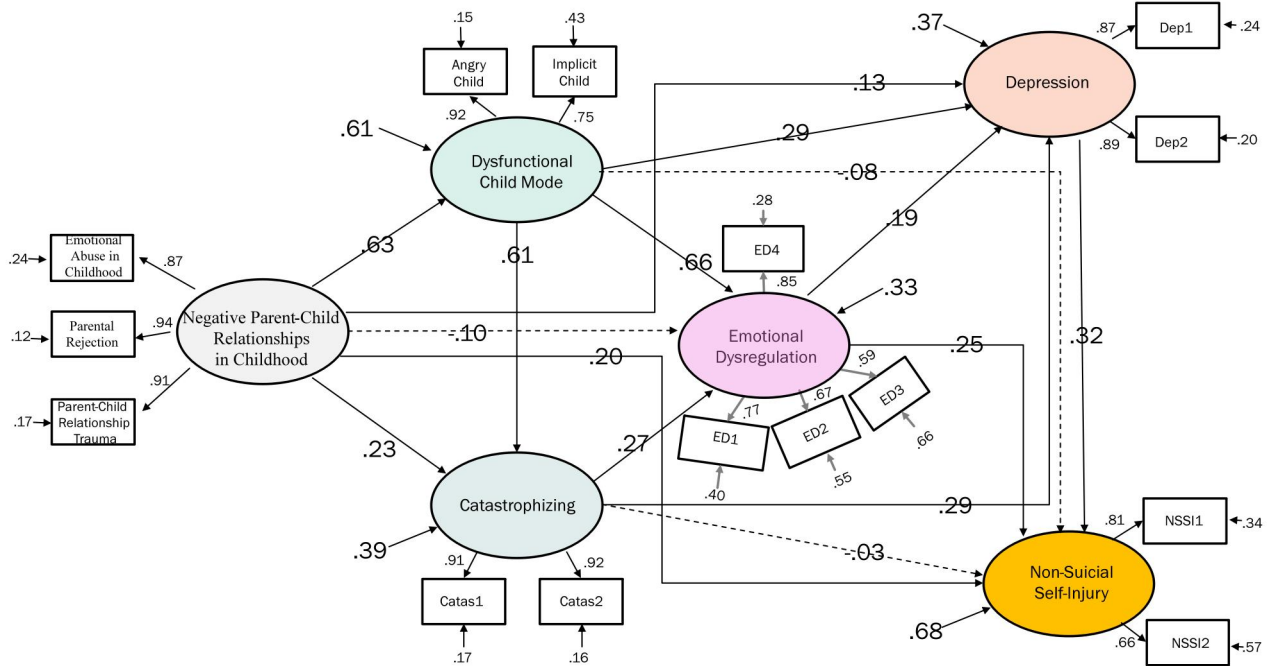


Figure 4. Result of the Hypothesized Model (All path coefficients are in standard metric)

Negative parent-child relationships in childhood had a positive effect on dysfunctional child mode ($\beta=.63, t=13.32, p<.001$), catastrophizing ($\beta=.23, t=4.36, p<.001$), depression ($\beta=.13, t=2.52, p<.05$), and non-suicidal self-injurious behavior ($\beta=.20, t=2.61, p<.01$), but not on emotional dysregulation ($\beta=-.10, t=-1.82, n.s.$). Dysfunctional child mode had a positive effect on catastrophizing ($\beta=.61, t=10.24, p<.001$), emotional dysregulation ($\beta=.66, t=7.43, p<.001$), and depression ($\beta=.29, t=3.00, p<.05$), but not on non-suicidal self-injurious behavior ($\beta=-.08, t=-.63, n.s.$). Catastrophizing had a positive effect on emotional dysregulation ($\beta=.27, t=3.61, p<.001$), and depression ($\beta=.29, t=4.08, p<.001$), but not on non-suicidal self-injurious behaviors ($\beta=-.03, t=-.30, n.s.$). However, emotional dysregulation had a significant effect on depression ($\beta=.19, t=2.26, p<.05$) and non-suicidal self-injurious behaviors ($\beta=.25, t=2.11, p<.05$).

As shown in Figure 4, for college students with high levels of non-suicidal self-injurious behavior, the study's hypothesized model, which posits that high levels of negative childhood parent-child relationships and the subsequent development of dysfunctional child modes contribute to maladaptive problems, explains 61% of the variance in catastrophizing, 67% of the variance in emotional dysregulation, 63% of the variance in depression, and 32% of the variance in non-suicidal self-injurious behavior. These results suggest that the development of negative parent-child relationships in childhood and the resulting dysfunctional child modes are well explained by our hypothesized model, which posits that negative thoughts and emotions lead to non-suicidal self-injurious behavior in college students.

3.4 Test of mediation

Analyses of the 10 multiple mediating effects of dysfunctional child mode, catastrophizing, emotional dysregulation, and depression on the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior in the hypothesized model revealed significance in three multiple paths, the results of which are presented in **Figure 5** and **Table 4**.

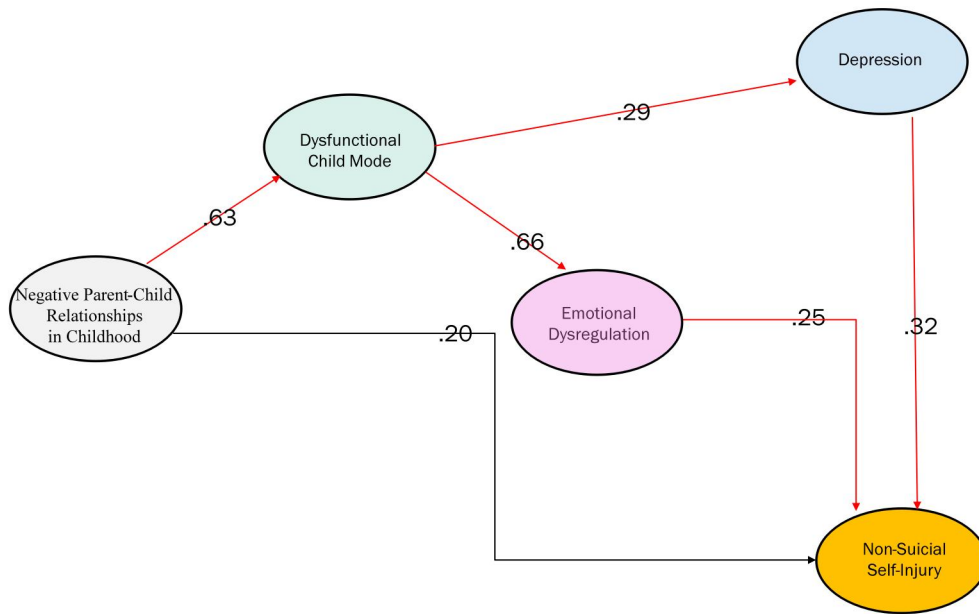


Figure 5. Schematic Picture of Structural Equation Model of Hypothesized Model (Identified Mediated Effect).

Table 4. Effects of negative parent-child relationship on non-suicidal self-injurious behaviors.

Pathway	Direct Effect	Indirect Effect
Parent-Child Relationship on Non-Suicidal Self-Injury	$b = .33 (t = 2.60, p < .01)$	
Parent-Child Relationship* Dysfunctional Child Mode *Depression		$b = .10 (t = 2.11, p < .05)$
Parent-Child Relationship* Dysfunctional Child Mode *Emotional Dysregulation		$b = .17 (t = 1.99, p < .05)$

The mediation effects of this study reveal that negative parent-child relationships in childhood not only directly contribute to non-suicidal self-injurious behaviors in college students, but also indirectly contribute to non-suicidal self-injurious behaviors in college students through the dual mediation processes of dysfunctional child mode and depression, and dysfunctional child mode and emotional dysregulation.

4. Discussion

This study investigated the mediation model involving dysfunctional child schema modes in a sample of non-suicidal self-injury college students and found support for the mediation model in which negative parent-child relationships in childhood directly influence depression and non-suicidal self-injurious behavior, as well as indirectly influence self-injurious behavior through the mediation model of dysfunctional child mode.

Based on the findings identified in this study, we summarize and discuss them in relation to the hypothesized model as follows:

First, negative parent-child relationships in childhood were found to have a positive influence on dysfunctional child modes. These findings are consistent with Young's ^[86] theory that dysfunctional schema modes develop in relation to negative experiences, particularly those related to attachment to early caregivers. It is expected that the more negative the parent-child relationship, the relationship with the initial caregiver that influences the attachment relationship during childhood, the more dysfunctional child modes will develop.

Second, negative parent-child relationships in childhood were found to have a positive influence on catastrophic thinking. These findings are consistent with prior research showing that negative childhood events contribute to the development of catastrophizing beliefs, such as that the world is not good, meaningful, and worthwhile ^[87] and that the world is extremely dangerous ^[88]. A variety of traumatic events alter people's thoughts and beliefs ^[89-91], so we would expect that the more negative the parent-child relationship during childhood, the higher the level of cognitive distortions, which in turn would contribute to the development of catastrophizing.

Third, dysfunctional child modes were found to have a positive influence on catastrophic thinking. These findings are consistent with the suggestion that early maladaptive schemas lead to distorted thinking ^[92]. Schema modes that appear with the activation of early maladaptive schemas resulting from negative childhood experiences, these dysfunctional schema modes lead to distorted thinking, such as catastrophizing. Therefore, it is expected that the more dysfunctional the child modes, the higher the level of catastrophizing, or distorted thinking.

Fourth, catastrophizing was found to have a positive influence on emotional dysregulation. These findings are consistent with Ellis's ^[24] proposal that catastrophic thinking, as one of the core irrational beliefs, contributes to emotional and behavioral disturbances. Catastrophizing, which is characterized by negative outcomes and extreme exaggeration of factual experiences, appears to be associated with greater difficulty in regulating one's internal and external emotional reactions to extreme experiences of factual situations. Therefore, higher levels of catastrophizing are expected to be associated with higher levels of emotional dysregulation.

Fifth, catastrophizing was found to have a positive influence on depression. These findings seem to be consistent with previous research by Abramson, Metalsky, and Alloy ^[93] that catastrophizing is a risk factor for depression. Furthermore, they are consistent with previous research showing that depressed people more frequently use dysfunctional cognitive emotion regulation strategies such as suppression, rumination, and catastrophizing to regulate their emotions ^[94-96] and that catastrophizing is the cognitive emotion regulation strategy most strongly associated with depression in adolescents of both sexes ^[25]. It is expected that the more catastrophic the perception of an unfortunate event as a terrible event ^[97], the more depressed one becomes.

Sixth, we found that emotional dysregulation had a positive influence on depression. These findings are consistent with the suggestion that emotion dysregulation underlies affective disorders such as depression ^[98] and is the most important concept for understanding depression ^[99, 100]. Emotional dysregulation is believed to play an important role in determining levels of depression by affecting levels of positive and negative emotions ^[101, 102]. Therefore, higher levels of emotional dysregulation are expected to be associated with higher levels of depression, a negative emotion.

Seventh, depression was found to have a positive influence on non-suicidal self-injurious behavior. These findings are consistent with previous research ^[103, 104]. It is also consistent with previous research that depression is associated with higher levels of non-suicidal self-injurious behavior and that depression

predicts increased non-suicidal self-injury [46]. Furthermore, as suggested by functional models of non-suicidal self-injury [105] and experiential avoidance models [106], non-suicidal self-injurious behaviors may be attempted or repeated in an attempt to regulate or avoid negative emotions such as depression. Therefore, higher levels of depression are expected to be associated with higher levels of non-suicidal self-injurious behaviors.

The mediating effects identified in this study are discussed below, along with their implications and significance.

Dysfunctional child modes and emotional dysregulation sequentially mediated the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior, while dysfunctional child modes and depression sequentially mediated the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior. These findings provide partial support for the etiologic theory of schema therapy, which posits that unmet core needs in childhood interact with temperament to develop maladaptive schemas, and that activation of maladaptive schemas triggers schema modes, resulting in psychological symptoms. If the mediator fully mediates the effect of the predictor variable on the criterion variable, it means that psychotherapeutic strategies should focus on the mediator rather than the predictor variable [107]. Therefore, it is recommended that psychotherapeutic interventions focusing on dysfunctional child modes should be implemented first in order to reduce non-suicidal self-injurious behaviors in college students who exhibit suicidal self-injurious behaviors due to negative parent-child relationships in childhood.

These findings suggest that it is important to address dysfunctional child modes in relation to non-suicidal self-injurious behavior in college clients and that addressing these modes alone may have multiple treatment effects (reducing emotional dysregulation, depression, and non-suicidal self-injurious behaviors). Psychological interventions may need to be sequenced to address dysfunctional child modes, followed by interventions to address more underlying negative parent-child relationships in childhood. Negative parent-child relationships in childhood can be effectively intervened with through the schema therapy of image rescripting [108]. Bang and Lee [109] found that an individualized mental rescripting intervention for non-suicidal self-injury college students significantly reduced their emotional dysregulation, depression, and frequency of non-suicidal self-injury, suggesting that schema therapy interventions may be effective in reducing non-suicidal self-injurious behaviors.

The implications of this research are: First, it is significant for identifying the psychological mechanisms by which negative parent-child relationships in childhood trigger dysfunctional child modes and lead to non-suicidal self-injurious behaviors in self-injury college students through a mediated process of emotional dysregulation and depression. Second, it is of great significance because it empirically supports and reaffirms the etiology proposed by schema therapy.

The limitation and future direction are: First, there is little research on schema modes as a psychological mechanism for non-suicidal self-injury. Therefore, replication studies are warranted to better understand the various multimodal pathways that emerged in this study. Second, this study was investigated using a professionally commissioned panel survey of non-suicidal self-injury college students, with a panel reflecting a wide range of demographic characteristics. However, panel surveys are targeted to specific populations and may not be representative of the population at large, limiting the generalizability of the findings. Third, the participants in this study were Korean college students in their late teens to late 20s, which limits the generalizability of the results. Future studies should expand the sample to a wider age range, including adults, and across different cultures to confirm the results of this study. In this way, follow-up

studies that complement and extend this study are expected to broaden the implications of the findings. In particular, since dysfunctional child modes have been identified as a psychological mechanism for non-suicidal self-injurious behavior, empirical research on therapeutic approaches from a schema mode perspective may be warranted.

5. Conclusion

Child modes and depression were found to be dual mediators of the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior, and child mode and emotional dysregulation were found to be dual mediators of the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior.

These results suggest that dysfunctional child modes may be a key psychological mechanism underlying the relationship between negative parent-child relationships in childhood and non-suicidal self-injurious behavior. Therefore, interventions for non-suicidal self-injury clients may benefit from addressing unmet needs in addition to interventions for negative childhood parent-child relationships.

Author contributions

Conceptualization, S. B. and E. L.; methodology, E. L. and S. B.; formal analysis, E. L. and S. B.; investigation, S. B. and E. L.; writing—original draft preparation, S. B. and E. L.; writing—review and editing, E. L. and S. B. All authors have read and agreed to the published version of the manuscript.

Funding

The authors received no funding for this study.

Conflict of interest

The authors declare no conflict of interest.

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