

## **Examining the Mediating Effects of Emotion Dysregulation in the Association Between Attachment with Parents and Non-Suicidal Self-Injury: A Cross-Sectional Study Among Undergraduate Students in a Private University in Taiwan**

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**Purpose:** The purpose of the present study was to examine the mediating role of emotion dysregulation on the association between attachment with parents and non-suicidal self-injury (NSSI) in Taiwanese undergraduates.

**Methods:** A total of 399 university students from Taiwan (mean age = 20.35 years) completed online self-report measures assessing attachment with parents, emotion dysregulation and self-harming behaviors. **Results:** Structural equation modeling indicated that attachment with parents and emotion dysregulation each had a direct association with NSSI. Emotion dysregulation partially mediated the correlation between attachment with parents and NSSI among Taiwanese young adults. Seventy-two participants (18%) reported engaging in NSSI in the past year. **Conclusions:** The results indicate that NSSI is a prominent health concern among Taiwanese young adults. For young adults from Taiwan or East Asian cultures, targeting emotion dysregulation in NSSI prevention and intervention could be beneficial.

**Keywords:** Attachment with parents, emotion dysregulation, non-suicidal self-injury, Taiwanese college students.

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Non-suicidal self-injury (NSSI), defined as intentionally harming oneself without the desire to die (Nock, 2010), has become an increasingly prevalent public health issue worldwide. A meta-analysis indicated that lifetime rates of NSSI are highest among adolescents and young adults; approximately 13.4% of young adults report engaging in some form of NSSI in their lifetimes (Swannell et al., 2014). In Taiwan, NSSI is also a prominent health concern since 15.81% of college students reported engaging in NSSI (Wang & Hsu, 2015). NSSI poses substantial health challenges and is associated with psychological disorders, including depression, anxiety and borderline personality disorder (Nock et al., 2006). Importantly, NSSI is a potentially dangerous behavior since NSSI can be a strong predictor of suicidal behavior (Hamza & Willoughby, 2016). The severity of NSSI and its high occurrence among college students highlight the significance of gaining knowledge regarding factors that contribute to the risk of NSSI.

Attachment with parents has long been identified in the theoretical and empirical literature as a key risk factor for the development of NSSI. Attachment theories indicate that the quality of the relationship between parents and children sets the foundation for personality development, and problems in attachment with parents may lead to various forms of psychopathology (Bowlby, 1973), including NSSI (Yates, 2004). Specifically, the affective bond between parents and children can be a source of security when encountering challenges or adversities in life. Children may form secure attachments if their parents are responsive and attentive to children's needs. On the contrary, difficulties in attachment with parents may disrupt children's abilities to manage distress in life. Children are likely to develop insecure attachments styles (e.g., anxious/resistant, anxious/avoidant or disorganized) if their parents are insensitive or emotionally unavailable when in distress (Mikulincer & Shaver, 2016). Disruptive attachment with parents can include parents being unresponsive to children, rejecting children or threatening to withdraw love from children (Bowlby, 1977). Such difficulties in attachment with parents may further contribute to children's adopting maladaptive coping strategies such as NSSI. While attachment relationships may be subject to change due to various experiences in life, empirical evidence substantiates that the influence of early relational experiences with caregivers can persist across developmental stages (Fraley & Roisman, 2015; Raby et al., 2015). Thus, difficulties in attachment with parents can play a significant role in individuals' maladaptive coping strategies such as NSSI in college

years.

The important role of attachment with parents in NSSI paralleled theoretical perspectives on the importance of invalidating environment (Crowell et al., 2009). Linehan's (1993) biosocial theory of borderline personality disorder (BPD) suggests that an invalidating environment contributes to the development of NSSI, an associated feature of BPD. The essential feature of an invalidating environment is the problematic relationships with parents in which expressing subjective experiences is not supported or is criticized, and communicating negative affect is discouraged or punished and an invalidating environment has been hypothesized to contribute to the development of NSSI (Jacobson & Batejan, 2014). Collectively, the theoretical literature suggests that attachment with parents plays an influential role in the etiology of NSSI.

The perceived quality of attachment to caregivers as a risk factor for NSSI or self-harm has received an increasing amount of research attention in recent years (Arbuthnott & Lewis, 2015; Martin et al., 2016; Zortea et al., 2021). Extensive research has supported the association between attachment with parents and NSSI in adolescents (e.g., Gandhi et al., 2016) as well as young adults (e.g., Braga & Gonçalves, 2014). Attachment with parents have also been found to be related to NSSI in psychiatric patients (e.g., Hsu et al., 2013). Longitudinal studies have also confirmed the link between attachment with parents and NSSI (e.g., Yates et al., 2008, Tatnell et al., 2017). In Taiwan, parent-child relations were associated with NSSI among adolescents (e.g., Chen, 2006; Luo et al., 2016). In a recent systematic review, Woo et al. (2022) found a consistent association between attachment with parents and NSSI in children and adolescents. Thus, empirical investigations are aligned with the theoretical perspectives of the development of NSSI and emphasize the critical role of attachment with parents in NSSI.

Given the strong association between attachment with parents and NSSI, emerging research has focused on examining factors that may account for this relationship. One potential mechanism is difficulties with emotion regulation. Emotion regulation refers to processes that are involved in modifying emotional experiences (Thompson, 1994). Two models of emotion regulation have been implicated in relation to NSSI – the process model of emotion regulation (Gross, 1998) and the multidimensional model of emotion regulation (Gratz & Roemer, 2004). The process model proposes that emotions arise and are conveyed in

a multi-stage process, and different emotion regulation strategies are involved in each stage. The model delineated two primary emotion regulation strategies based on when these strategies occur. Antecedent-focused strategies (such as cognitive reappraisal) are techniques that individuals may use in stages before emotions are generated and expressed. Response-focused strategies (such as expressive suppression) are techniques that individuals may use after emotional responses have been elicited. By contrast, the multidimensional model of emotion regulation is a comprehensive conceptualization of emotion regulation, and underscores identifying emotions and abilities to control behaviors when having negative emotions. Emotion regulation, according to Gratz and Roemer (2004), can be characterized by the ability to identify, and accept emotions, to control impulses, and to adopt flexible strategies. A lack of any of these skills can be referred to as "emotion dysregulation."

Several theoretical models have suggested that emotion dysregulation can be an essential mechanism in understanding the connection between attachment with parents and NSSI (e.g., Yates, 2004). For instance, the functional model of NSSI indicated that individuals may engage in NSSI due to affect dysregulation and social dysregulation such as relationship difficulties with parents (Nock & Prinstein, 2004). The developmental model of NSSI proposed that childhood maltreatment (including problems in attachment with parents) may affect individuals' capacity for emotion regulation and may further contribute to NSSI (Yates, 2004). Finally, the aforementioned theoretical work proposed by Linehan (1993) also suggested that the interactions of an early invalidating environment and emotion dysregulation may lead to maladaptive coping behaviors, such as NSSI. Thus, theoretical literature pointed out that emotion dysregulation may account for the associations between attachment with parents and NSSI.

Consistent with these theoretical perspectives, empirical studies have found that parent-child attachment are associated with difficulties with emotion regulation (Alink et al., 2009; Morris et al., 2002) and emotion dysregulation has been identified as a key risk factor in the development of NSSI or self-harm (Brereton & McGlinchey, 2020 ; Gratz & Roemer, 2008; Zelkowitz et al., 2016). In a recent meta-analysis, Wolff et al. (2019) found a strong association between emotion dysregulation and NSSI, in which the limited access to emotion regulation strategies exhibited the strongest relationships with NSSI.

Several studies have investigated the influence of emotion dysregulation on NSSI and relationship difficulties with parents (e.g., Adrian et al., 2011 & Yurkowski et al., 2015). Adrian et al. (2011) used a clinical sample of predominantly Caucasian adolescents and found that emotion dysregulation accounted for the correlation between NSSI and relationship difficulties with parents (along with peers). Yurkowski et al. (2015) used a sample of predominantly Caucasian college students, and these researchers' findings yielded mixed results. They found that attachment with parents did not directly predict NSSI though attachment with parents were more influential in predicting NSSI than attachment with peers. More importantly, parental alienation (along with peer alienation) predicted NSSI through emotion dysregulation. In a sample of Australian young adults, Tatnell et al. (2018) found that emotion dysregulation (i.e., limited access to emotion regulation strategies) mediated the association between NSSI and attachment anxiety related to mothers. Recently, Guérin-Marion et al. (2021) used latent profile analysis to examine the emotion dysregulation profile in predominantly Caucasian college students with NSSI. They found that students in the Dysregulated profile (i.e., having the highest difficulty in regulating negative emotions) perceived their attachment experiences with parents (such as parental alienation, unresolved attachment and psychological control) as most negative.

Taken together, most of the studies examining the associations among attachment with parents, emotion dysregulation and NSSI have been conducted with European or European American samples. Limited research examined the role of emotion dysregulation in the link between attachment with parents and NSSI among Taiwanese young adults. In a sample of Taiwanese male adolescents, Chun and Chen (2017) found that emotion dysregulation (along with negative emotions) mediated the association between insecure attachment styles and NSSI. While their findings provided preliminary evidence for the importance of emotion dysregulation, their findings focused on insecure attachment styles in male adolescents. It remains to be seen regarding the role of emotion dysregulation in the associations between attachment with parents and NSSI among college students in Taiwan. The college years represents the transition from adolescent to adulthood and features a potentially stressful and challenging period (Arnett, 2000) and is also one of increased risk for mental health problems, including NSSI (Kiekens et al., 2019). More empirical studies on the etiology of NSSI among Taiwanese young adults are needed, since the idea that results from Western

countries in NSSI research can generalize to Eastern countries is questionable, especially given cultural differences such as collectivism and individualism (Kim et al., 2001).

### **The Present Study**

Based on the empirical and theoretical literature discussed above, preliminary evidence suggests that attachment with parents and emotion dysregulation are associated with NSSI in Western countries. However, given that parent-child attachment, emotion dysregulation and NSSI do not exist within a cultural vacuum, whether these associations can generalize to Taiwanese young adults needs to be examined. The present study aims to extend the work of Yurkowski et al. (2015) among Taiwanese young adults by exploring the role of emotion dysregulation in the link between attachment with parents and NSSI. The results of the present study can provide a deeper knowledge of the etiology of NSSI in non-Western cultures and can give directions in developing effective clinical interventions for Taiwanese college students. Specifically, without empirical evidence on whether emotion dysregulation plays a role in the attachment with parents and NSSI, imposing interventions targeting emotion dysregulation for Asian or Taiwanese young adults with NSSI may be premature and may accidentally jeopardize their well-being. For instance, DBT has been identified as one of the effective treatment approaches for NSSI (Glenn et al., 2019) and a key component of DBT is to target emotion dysregulation among individuals with NSSI (Linehan, 1993). However, if we do not know whether emotion dysregulation plays a key role in NSSI among Asian young adults, there is possibility that focusing on emotion dysregulation may not be applicable to this population, especially given recent discussions on cultural differences about the effect of emotion regulation on mental health (Tsai & Lu, 2018).

The purpose of the present study is to use a structural equation modeling (SEM) approach to examine the hypothesized model, which includes one latent variable (attachment with parents), one latent mediator variable (emotion dysregulation) and one outcome variable (NSSI frequency). Given that research indicates that females are more likely to report engaging in NSSI behaviors than males (e.g., Sornberger et al., 2012), sex was controlled as covariates in the models. There are three hypotheses: 1) that attachment with parents (represented by three variables: communication, trust and closeness) have a direct negative relationship with NSSI, 2) that emotion dysregulation has a direct positive relationship with

NSSI, and 3) that the attachment with parents and NSSI is mediated by emotion dysregulation.

Additionally, in order to gain a deeper knowledge into the influence of dimensions of emotion dysregulation on attachment with parents and NSSI, we conducted exploratory analyses to test the mediating role of specific dimensions of emotion dysregulation in the relations between attachment with parents and NSSI. Since there is limited research in this area among Taiwanese college students, we do not have a priori hypothesis.

## Method

### Participants

A total of 423 undergraduate students from a university in Taiwan completed an online survey. The inclusion criteria were: 1) between age 18 and 26 years, and 2) college students. Participants were excluded from the study if they provided invalid responses. Twenty-four participants were removed due to invalid responses (i.e., gave the same ratings on one or all of the measures). The final sample consisted of 399 students (mean age = 20.35 years; standard deviation = 1.26). Participants were predominantly female (75.7%). There were 81 (20.3%) freshmen, 130 (32.6%) sophomores, 146 (36.6%) juniors, 39 (9.8%) seniors, and 3 (0.8%) other. The majors were Liberal Arts & Social Sciences (47.6%), Foreign Languages (5.8%), Science (18%), Law (7%), Business (26%), and Big Data Management (1%). The nationality reported by the participants were Taiwan (94.2%), China (2.5%), Hong Kong and Macau (2.3%), Southeast Asia (0.5%), and other (0.5%).

### Measures

#### *Non-Suicidal Self-Injury*

The Deliberate Self-Harm Inventory (DSHI) is a behaviorally based, self-report instrument assessing engagement in NSSI in the past year (Gratz, 2001). The DSHI examines 17 types of NSSI behaviors, including 16 different forms of self-harming behaviors (e.g., cutting, biting and burning) and one additional item asking about other forms of self-harming behaviors that are not captured. For each NSSI behavior, participants are asked whether they

have engaged in that NSSI behavior "without intending to kill yourself." Participants are also asked to specify the frequency and severity of the behavior. The frequency of the behavior was rated on a 6-point scale (see Ren et al., 2018, for a similar rating) for a similar rating), ranging from: 0 (*never*), 1 (*once*), 2 (*twice*), 3 (*three times*), 4 (*four times*), and 5 (*almost always*). Consistent with past research (e.g., Gratz, 2006), a continuous variable assessing frequency of NSSI was constructed by summing participants' scores on the frequency questions in DSHI. The DSHI exhibits good reliability, and construct, convergent, discriminant validity among college students (Gratz, 2001). The Chinese version of the DSHI translated by Lu (2007) was used and has demonstrated satisfactory reliability and sufficient concurrent validity (Hsieh, 2012; Lu, 2007). In the current study, the Cronbach's alpha was .73.

### ***Emotion Dysregulation***

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a widely used 36-item measure designed to assess individuals' level of emotion dysregulation (11 items are reverse-scored). Each item was measured on a 5-point Likert-type scale ranging from 1 (*almost never*) to 5 (*almost always*). Higher scores indicated a higher level of emotion dysregulation. The DERS has six subscales: (a) awareness: measures the degree of lacking ability to acknowledge emotional responses (6 items); (b) clarity: assesses the degree of lacking ability to understand their emotional responses (5 items); (c) impulse: assesses the extent of lacking ability to control impulses (6 items); (d) non-acceptance: assesses difficulty in accepting emotional responses (6 items); (e) strategies: assesses difficulties in using effective ways to manage emotions (8 items); and (f) goals: measures the degree of lacking capacity to focus on tasks when experiencing negative emotions (5 items). The DERS has demonstrated strong reliability, and adequate construct validity (Gratz & Roemer, 2004). The Chinese version of the DERS translated by Lu (2007) was employed, and has revealed high internal consistency ( $\alpha = .92$ ) and adequate construct validity (Lu, 2007). The Cronbach's alpha in the current study was .93.

### ***Attachment with Parents***

The Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) is a self-report instrument designed to measure the quality of one's attachment with parents (28-

item IPPA-Parent) and attachment with peers (25-item IPPA-Peers). In this study, only the 28-item IPPA-Parent was used (11 items are reverse-scored). Each item was measured on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*always*). Higher scores reflect higher quality of relationships with parents. The IPPA-parent has three subscales: (a) parent communication: measures the perceived quality of spoken communication (10 items); (b) parent trust: assesses the perceived extent of mutual understanding in a relationship (10 items); and (c) parent alienation: measures the perceived feelings of anger and closeness (8 items). The parent alienation subscale items were reverse-scored. For the purposes of conceptual consistency and consistent with previous research (Jiang et al., 2017), the parent alienation subscale was renamed as "parent closeness" in the present study. The IPPA-Parent has demonstrated strong reliability and validity (Armsden & Greenberg, 1987). The Chinese version of the IPPA-Parent translated by Tseng (2009) was used, and has revealed high internal consistency and good construct validity in young adults (Su, 2012). The Cronbach's alpha in the current study was .93.

### **Procedure**

All study procedures were approved by the university's research ethics board (NTU-REC No.: 201902ES009). The researchers contacted professors at a university in Taiwan and asked for permission to present the study in class. The researchers recruited students to participate in the study. Students were given a link to the study and participation were voluntary. Participants received extra credit for compensation and were informed that the study's purpose was to understand NSSI. A secure website was also created for this study. After signing the informed consent form, each participant was instructed to complete the survey in a randomized order and was subsequently directed to another website to provide their student ID for extra credit. Then, the participant was directed to a webpage with mental health resources.

### **Analysis**

The bivariate correlations between the variables were examined with SPSS 20. The SEM analyses were carried out using the R (R Core Team, 2016) Lavaan package. Because NSSI frequency was not normally distributed, the model parameters were estimated with robust maximum-likelihood estimation (Satorra & Bentler, 1994).

The model examined the predictors of frequency of NSSI and hypothesized that emotion dysregulation and attachment with parents directly predicted NSSI. The emotion dysregulation and attachment with parents were treated as two higher order factors. Specifically, the emotion dysregulation factor was characterized by six first-order factors, including Nonacceptance, Goal, Clarity, Strategy, Impulse and Awareness, and the attachment with parents factor was characterized by three first-order factors, including Parent Communication, Parent Closeness and Parent Trust. Higher order factor structures were chosen to model these two variables given that multiple factors are often desired to account for the covariances among multiple indicators of a specific construct. As indicated by Brown (2015), the advantage of the higher-order factor analysis lies in its capacity to allow for a more parsimonious explanation for the correlations among lower-order factors. Participants' sex was entered as covariates in all models.

Model fit was assessed with four fit indices: the Chi-square test, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root-mean square residual (SRMR). Good model fit was evaluated as follows: CFI values greater than .90 and RMSEA and SRMR values less than .08 (Hu & Bentler, 1999). Modification indices were used to improve the goodness of fit of the model according to its theoretical underpinnings (Kline, 2011).

Bootstrapping, a non-parametric resampling procedure, was used to estimate the significance of any indirect effects (Preacher & Hayes, 2004). Researchers have recommended using the bootstrapping method because that approach directly tests the indirect effects and is statistically powerful (McCartney et al., 2006). Thus, bootstrapping was performed with 1,000 random samples generated from the observed covariance matrix and the 95% confidence interval excluding zero indicates the significance of the meditational pathways.

## Results

### Descriptive Analyses and Preliminary Analyses

Means and bivariate correlations are shown in Table 1. The mean of NSSI frequency was

0.94 (ranging from 1 to 30 times), and the standard deviation was 3.22. The median of NSSI frequency was 0 and the interquartile range was 0. Age was not associated with NSSI frequency ( $r = .097, p > .05$ ).

Seventy-two participants (18%) reported NSSI engagement in the past year. Of those who self-injured, the majority reported having harmed themselves more than one time (79%). Moreover, 55.5% of the self-harming participants reported engaging in two or more types of self-harm behavior. Table 2 lists the forms of NSSI. The most prevalent forms of NSSI were scratching to bleeding (45.8%), skin-cutting (33.3%), and punching (31.9%).

### Primary Analysis

The baseline SEM model showed acceptable fit,  $\chi^2/df = 4469.48/2068 = 2.16, p < .05$ , RMSEA = .058, SRMR = .084, CFI = .839. However, CFI fell below the accepted threshold, and inspection of the model indicated that a lack of emotional awareness did not load onto the latent variable (standardized  $\beta = -0.051$ ). Indeed, the DERS Awareness subscale is often problematic and research have indicated that the subscale does not correlate with other DERS subscales (see Lee et al., 2016). An examination of the modification indices suggested high correlation of residuals between items of the following subscales: Nonacceptance, Strategies, Clarity, Impulse, Alienation, Trust and Communication. The modification indices also indicated a high correlation of the residuals of DERS subscale items (e.g., DERS 1 and DERS 7 in the Clarity subscale) and IPPA-Parent subscale items (e.g., Parent 13 and Parent 14 in the Trust subscale). The Chinese versions of the DERS and IPPA items are shown in Supplementary Table S1 and Table S2.

Based on the above-mentioned data-driven suggestions, modifications that are theoretically reasonable were made to improve model fit. For example, the modification regarding the residual correlation between DERS 1 (I am clear about my feelings) and DERS 7 (I know exactly how I am feeling) were made due to their high similarity in the item content. Consequently, a second model was constructed that excluded lack of emotional awareness and added the residual covariance for the aforementioned indicators (Figure 1). The second model demonstrated good model fit,  $\chi^2/df = 3038.27/1679 = 1.81, p < .05$ , RMSEA = .048, SRMR = .067, CFI = .904.

Table 1

## Correlation Matrix and Descriptive Statistics (n = 399)

Study variables	1	2	3	4	5	6	7	8	9	10	11
1. Parent trust											
2. Parent communication	.84 <sup>***</sup>										
3. Parent closeness	.83 <sup>***</sup>	.79 <sup>***</sup>									
4. Nonacceptance	-.30 <sup>***</sup>	-.26 <sup>***</sup>	-.44 <sup>***</sup>								
5. Awareness	-.09 <sup>*</sup>	-.05	.03	-.05							
6. Clarity	-.18 <sup>***</sup>	-.07	-.18 <sup>***</sup>	.46 <sup>***</sup>	.43 <sup>***</sup>						
7. Goals	-.29 <sup>***</sup>	-.23 <sup>***</sup>	-.36 <sup>***</sup>	.52 <sup>***</sup>	-.07	.34 <sup>***</sup>					
8. Impulse	-.31 <sup>***</sup>	-.24 <sup>***</sup>	-.40 <sup>***</sup>	.62 <sup>***</sup>	-.05	.38 <sup>***</sup>	.53 <sup>***</sup>				
9. Strategies	-.41 <sup>***</sup>	-.37 <sup>***</sup>	-.55 <sup>***</sup>	.76 <sup>***</sup>	-.05	.42 <sup>***</sup>	.62 <sup>***</sup>	.73 <sup>***</sup>			
10. NSSI frequency	-.24 <sup>***</sup>	-.20 <sup>***</sup>	-.28 <sup>***</sup>	.18 <sup>***</sup>	.01	.15 <sup>**</sup>	.20 <sup>***</sup>	.27 <sup>***</sup>	.29 <sup>***</sup>		
11. Sex	-.07	-.13 <sup>**</sup>	-.09	.03	-.04	-.04	-.02	.03	.03	-.02	
Mean	35.91	31.33	27.36	16.64	11.93	11.56	16.30	12.39	21.50	0.94	0.24
SD	7.69	8.90	6.87	5.17	3.42	3.67	4.21	5.06	6.85	3.22	0.43

Note. Nonacceptance = nonacceptance of negative emotions; Awareness = lack of emotional awareness; Clarity = lack of emotional clarity; Goals = difficulties engaging in goal-directed behaviors when distressed; Impulse = difficulties controlling impulsive behaviors when experiencing negative emotions; Strategies = limited access to emotion regulation strategies perceived as effective; NSSI frequency = nonsuicidal self-injury frequency.

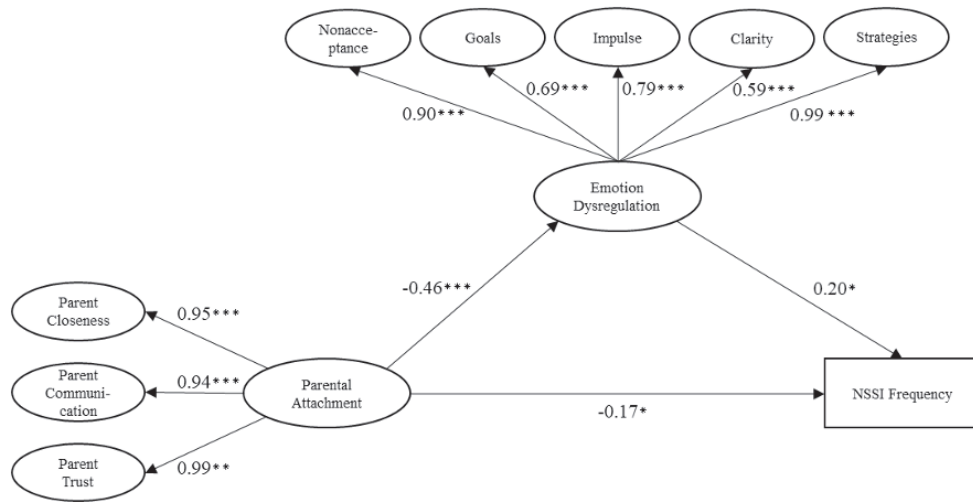
\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table 2***Reported Forms of NSSI for the Total Sample and by Gender*

	Percentage of Participants ( <i>n</i> )		
	Total	Females	Males
Forms of NSSI	( <i>n</i> = 72)	( <i>n</i> = 52)	( <i>n</i> = 20)
Cutting	33.3 (24)	36.5 (19)	25 (5)
Burning with cigarettes	2.8 (2)	3.8 (2)	0 (0)
Burning with lighter	2.8 (2)	3.8 (2)	0 (0)
Carving words	6.9 (5)	9.6 (5)	0 (0)
Carving pictures	9.7 (7)	7.7 (4)	15 (3)
Scratching to bleeding	45.8 (33)	55.8 (29)	20 (4)
Biting	29.2 (21)	28.8 (15)	30 (6)
Rubbing sandpaper	0 (0)	0 (0)	0 (0)
Dripping acid	0 (0)	0 (0)	0 (0)
Using bleach to scrub skin	0 (0)	0 (0)	0 (0)
Sticking objects	2.8 (2)	3.8 (2)	0 (0)
Rubbing glass	2.8 (2)	3.8 (2)	0 (0)
Breaking bones	0 (0)	0 (0)	0 (0)
Banging head	15.3 (11)	13.5 (7)	20 (4)
Punching self	31.9 (23)	23.1 (12)	55 (11)
Prevent wounds from healing	8.3 (6)	9.6 (5)	5 (1)
Other	25 (18)	26.9 (14)	20 (4)

*Note.* *n* = number of participants.

**Figure 1**  
SEM model.



*Note.* Sex is controlled as covariates but not shown.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

As shown in Figure 1, the direct path from emotion dysregulation to NSSI frequency was significant ( $\beta = .20, p = .016$ ), and the direct path from attachment with parents to emotion dysregulation was likewise significant ( $\beta = -.46, p = .000$ ). The direct path from attachment with parents to NSSI was also significant ( $\beta = -.17, p = .010$ ). Bootstrapping for indirect effects indicated a significant indirect effect of attachment with parents on NSSI through the pathway of emotion dysregulation,  $\beta = -.094, p = .018, 95\% \text{ CI } [-0.052, -0.554]$ . The ratio of the indirect effect to the total effect is  $| -0.094 | / | -0.17 | + | -0.094 | = 0.356$ , indicating that 35.6% of the effect of parental attachment on NSSI frequency occurred through emotion dysregulation. Overall, these findings suggest that emotion dysregulation partially mediates the correlation between attachment with parents and NSSI.

Considering the highly skewed NSSI frequency scores observed in Table 1, it is possible that the normality assumption required for SEM is not satisfied. As a result, the robustness of the results from our mediation model may be compromised. Given that a large proportion of participants reported no history of NSSI, NSSI frequency scores were modeled as zero-inflated count variables (Coxe et al., 2009) to conduct sensitivity analysis. We used the *maczic* package in R (Cheng et al., 2018). The results parallel the path analysis and are displayed in Supplementary Table S3. Similarly, the results of the sensitivity analysis explicitly showed that 37% of the association was mediated by emotional dysregulation.

Exploratory analyses were conducted to test the mediation model with attachment with parents, facets of emotion dysregulation being the mediators, and NSSI frequency. Supplementary Figure S1 shows the standardized regression coefficients of this mediation model. The model exhibited acceptable fit,  $\chi^2/df = 3776.40/1676 = 2.25, p < .05, \text{RMSEA} = .060, \text{SRMR} = .133, \text{CFI} = .852$ .

## Discussion

NSSI has become a major mental health concern among college students worldwide (Kiekens et al., 2019). Limited attention, however, has been paid to NSSI among college students in Taiwan. This study is the first to use a Taiwanese young adult sample to examine whether emotion dysregulation mediates the correlation between attachment with parents and NSSI. Results from structural equation modeling indicated that emotion dysregulation

partially mediated the association between attachment with parents and NSSI engagement.

Our first hypothesis—that attachment with parents would be negatively related to NSSI—was supported. Although this finding was not in line with the work of Yurkowski et al. (2015) (i.e., attachment with parents did not directly predict NSSI), our finding was consistent with some past works (e.g., Gandhi et al., 2016; Gratz, 2006) indicating that attachment with parents can play a key role in NSSI. Results of the present study suggested that how Taiwanese young adults perceive parent communication, parent trust, and parent closeness can be related to their development of NSSI. Such findings parallel previous research using samples of adolescents in Taiwan (e.g., Chen, 2006, Hsu et al., 2013). For instance, in one of the pioneering studies on self-injury in Taiwan, Chen (2006) found that adolescents who did not have good parent-child relationships were more likely to engage in NSSI. Our results add to the existing literature underscoring the influential role of the quality of family relationships in NSSI among college students in Taiwan. Thus, even though college years may be perceived as a developmental period of transitioning into adulthood and may rely less on support from parents (Arnett, 2000), our results indicated that attachment with parents can still be associated with NSSI among Taiwanese young adults.

Our second hypothesis—that emotion dysregulation would be positively related to NSSI—was supported. This finding was consistent with theoretical models that postulated that the key factor that may account for NSSI is difficulties with emotion regulation (e.g., Chapman et al., 2006; Linehan, 1993). This finding also adds to the ample evidence for the relevance of emotion dysregulation to NSSI based on Western cultures (see Wolff et al., 2019 for a review). Indeed, emerging research based on Taiwanese adolescents also point to the important role of emotion dysregulation in NSSI (e.g., Chun & Chen, 2017; Luo et al., 2016). For instance, Chun and Chen (2017) found that emotion dysregulation accounted for the link between insecure attachment styles and NSSI in Taiwanese male adolescents. Luo et al. (2016) found that alexithymia contributes to NSSI among Taiwanese adolescents. Together, the present findings extend this line of research supporting the relationship between emotion dysregulation and NSSI among Taiwanese young adults.

Our third hypothesis on the mediating role of emotion dysregulation has received support. Our results are consistent with the findings of Adrian et al. (2011) and Yurkowski et al. (2015) and provide evidence for the applicability of the model that individuals' difficulties

with emotion regulation may account for the link between attachment with parents and NSSI. While theoretical literature indicates that the ways in which individuals regulate their emotions are affected by cultural values (Mesquita, & Frijda, 1992), the current findings provided preliminary support to the notion that emotion dysregulation can be a mediator in the link between attachment with parents and NSSI among Taiwanese young adults. However, the mediating role of emotion dysregulation was partial rather than complete and results needs to be interpreted with caution. Taken together, identifying the role of emotion dysregulation on the association between attachment with parents and NSSI can be important for Taiwanese young adults because targeting emotion dysregulation can be a more realistic therapeutic goal than focusing on relationships with parents given cultural values in Eastern countries such as honoring the family and loss of face (Kim et al., 2001). Since disclosing problems in family relationships can harm the family name in Asian cultures, focusing on attachment with parents initially may not be helpful for Taiwanese young adults in interventions and treatment of NSSI. The current study suggests that targeting emotion dysregulation can be helpful for individuals with NSSI in Taiwan.

An exploratory analysis was conducted to test the mediation model of the mediating effect of specific dimensions of emotion dysregulation in the link between attachment with parents and NSSI. The model exhibited acceptable fit to the data, as evidenced by the fit indices. However, most facets did not exhibit significantly unique mediation effects on the relationship between attachment with parents and NSSI. One possible reason for the insignificant mediation effects may be due to the high correlations among the factors (Brown, 2015). For instance,  $r = .83$  ( $p < .001$ ) between Parent Trust and Parent Communication;  $r = .42$  ( $p < .001$ ) between Strategies and Clarity. Future research may consider using variable selection (such as Lasso regression developed by Tibshirani, 1996 or stepwise selection) to determine which facets of emotion dysregulation may affect NSSI.

Regarding NSSI behaviors, the present study found that NSSI is a prominent concern in a sample of Taiwanese young adults, with a 12-month NSSI prevalence of 18%. The NSSI prevalence in the current sample was within the international prevalence range reported by other studies (Swannell et al., 2014). The 12-month prevalence of NSSI in the current study was comparable to that reported by previous studies (i.e., 15.81%) among Taiwanese university students (Wang & Hsu, 2015). The results from these studies supported that NSSI

represents a worldwide public health concern among young adults.

With regard to the methods of NSSI, the most frequently reported methods of NSSI by the total sample were scratching to bleeding (45.8%), skin-cutting (33.3%) and punching self (31.9%). This is similar to some previous studies based on Western cultures using college student samples (e.g., Heath et al., 2008; Whitlock et al., 2011). For instance, Whitlock et al. (2011) found that the most common NSSI behaviors reported by the participants were scratching (51%), cutting (39.3%), and banging objects (26.2%). However, our results were not consistent with other studies using college student samples (e.g., Glenn & Klonsky, 2011; Hamza et al., 2013). For instance, Hamza et al. (2013) found that the most common NSSI behaviors reported by the participants were hair pulling/pinching (24%) and self-hitting/head banging (21.9%). It is possible that the differences might be due to the different instruments that were used to assess NSSI behaviors since different instruments may ask different types of NSSI behaviors. Indeed, in one of the few studies examining NSSI among college students in Taiwan (Wang & Hsu, 2015), the most frequently reported behaviors by the participants were wall punching (59.74%), punching oneself (25.97%) and cutting (24.68%). Given that the present study did not include the question of wall punching, it is difficult to compare the results of the two studies.

Another possible reason that may lead to differences in NSSI methods endorsed by participants is gender differences. Our results indicated that there were gender differences with regard to NSSI methods such that the most frequently reported NSSI methods endorsed by females were scratching and cutting, and the most frequently reported methods of NSSI by males were punching and biting. Our results are consistent with a meta-analysis indicating that women were more likely to engage in cutting or scratching while men were more likely to engage in banging, or hitting (Bresin & Schoenleber, 2015). While there were some preliminary discussions about the element of seeing blood in NSSI engagement among females (Sornberger et al., 2012), our findings suggest that it will be helpful for future studies to examine the underlying reasons for gender differences in NSSI methods among Taiwanese college students.

### **Limitations and Future Directions**

Several limitations of the present study should be considered. First, this study used a

cross-sectional design and limited claims can be made about causal inferences. Future research can use longitudinal designs to examine the relationships among these variables. Second, the sample composition of non-clinical young adults in one private university in Taiwan raises questions about the generalizability of the findings. Future studies may consider recruiting college students from more than one school or may use stratified sampling method to obtain more representative samples of college students in Taiwan. Third, we did not ask participants about their main caregivers in their early life. Given that participants' responses to the questions about IPPA-Parent may be affected by the family environment they grew up with (such as single-parent families, raised by grandparents, etc.), it is recommended that future research could gather this information. Fourth, although the results suggest that emotion dysregulation can be influential in understanding NSSI, partial mediation may indicate that other factors not examined in the current study may lead to NSSI. Indeed, even though the direct path from emotion dysregulation to NSSI frequency was significant ( $\beta = .20, p = .016$ ) and the direct path from attachment with parents to NSSI was also significant ( $\beta = -.17, p = .010$ ), the low beta coefficients suggest that there might be other factors that may account for the relationships. More research will be needed to determine whether there are other predictors (such as childhood trauma) or other mediators (such as rumination) that may contribute to NSSI among Taiwanese college students.

Finally, our results may be limited by the measures that were used. Indeed, we conducted a confirmatory factor analysis to examine whether the measurement model fit the data and the results only indicated an acceptable fit to the data,  $\chi^2/df = 4305.865/1942 = 2.217, p < .05$ , RMSEA = .05, SRMR = .08, CFI = .84. Although the RMSEA and SRMR values showed a good fit, the CFI fell below accepted thresholds. The standardized factor loadings of the measured variables on the latent variables were significant at  $p < .001$ , except for the DERS Awareness and Strategy Subscales (see Supplementary Table S4). The correlations between the latent variables were statistically significant at  $p < .001$ . This parallels our SEM results in which our baseline model only exhibited adequate fit and the areas of misfit seem to lie in the high correlations of residuals among some items and the Awareness subscale. Thus, although our second model showed good fit after making these changes, our results should be interpreted with caution and future research should further validate these measures among college students in Taiwan in order to advance our understanding of NSSI.

### **Practical Implications**

Based on the results of the present study, we made recommendations for prevention and interventions of NSSI. In general, our results suggest that focusing on the quality of attachment with parents as well as incorporating components of emotion dysregulation into the framework of evidence-based prevention and intervention programs (see Witt et al., 2021 for a review) could be helpful in reducing NSSI engagement among college students in Taiwan. Our results indicate that schools or mental health professionals may consider offering psychoeducational programs or workshops related to identifying the influence of parent-child relationships along with skills for managing negative emotions in order to reduce NSSI among college students in Taiwan.

With regard to interventions related to attachment with parents, we recommend that therapists can evaluate the quality of clients' attachment with their parents and assist clients with becoming aware of how their behaviors may be affected by their attachment relationships with parents. For instance, Cognitive Behavior Therapy (CBT) has been identified as an evidence-based intervention for self-harm (Witt et al., 2021) and one of the key components of CBT is to assist clients with being cognizant of how they make sense of distressing emotional experiences in order to modify their behaviors. Clinicians may evaluate NSSI clients' relationships with parents (especially related to how they communicate with their parents, how they may be able to trust or connect with their parents) and work with clients to gain awareness of how their attachment with parents may affect their negative emotions, and how their behaviors may be affected by these experiences in order to assist clients with changing how they cope with negative emotions. By doing so, they may rely less on NSSI to manage their negative emotions.

Pertaining to interventions related to emotion dysregulation, we recommend that clinicians working with clients with NSSI may consider improving clients' abilities to discern, accept and understand the functions their emotions, as well as enhancing abilities to control impulses and broaden their use of effective strategies. Therapeutic approaches based on empirical evidence for NSSI aimed at addressing emotion dysregulation (such as Dialectical Behavior Therapy and Emotion Regulation Group Therapy) may be particularly beneficial (see Turner et al., 2014 for a review). For instance, Dialectical Behavior Therapy (Linehan,

1993) could be beneficial for reducing NSSI since DBT proposes that suicidal behaviors (including NSSI) stem from emotion dysregulation and offers therapeutic techniques focusing on increasing clients' abilities to regulate emotions, including teaching clients to label and identify their emotions, to understand the functions of their emotions, and to withstand and accept extreme negative emotions rather than attempting to change these emotions. Through obtaining these emotion regulation skills, clients may learn to recognize or cope with their negative emotions instead of avoiding or using NSSI to regulate negative emotions.

Emotion Regulation Group Therapy (ERGT; Gratz & Gunderson, 2006) may also be useful for reducing NSSI. ERGT is an adjunctive 14-week group therapy and was developed to decrease NSSI through teaching clients with emotional acceptance and emotion regulation. While interventions focusing on emotion regulation might be helpful for NSSI clients, clinicians still need to be cautious when using these interventions to Taiwanese young adults struggling with NSSI since there is limited empirical evidence on how facets of emotion dysregulation are related to NSSI in this population. It is recommended that future studies should evaluate the effectiveness of these prevention and intervention programs among college students with NSSI in Taiwan.

## **Conclusion**

Recent research underscores the important role of emotion dysregulation in the link between parental attachment and NSSI. However, limited research examined these key factors for NSSI among Taiwanese young adults. Understanding crucial mechanisms that influence NSSI is essential in order to develop effective prevention and intervention programs for NSSI among Taiwanese young adults. The present study extends existing research and found that how Taiwanese young adults perceive their attachment with parents can be related to their engagement in NSSI. The current findings also indicated that Taiwanese young adults' capacity to regulate their affect may be linked to NSSI engagement. More importantly, we found that emotion dysregulation partially mediated the association between attachment with parents and NSSI engagement. Our findings provided preliminary evidence that targeting emotional dysregulation along with relationships with parents among Taiwanese young adults struggling with NSSI may be beneficial. The current findings represent an important step

toward understanding key factors that influence NSSI within Taiwanese young adults and provide directions for future research to best help Taiwanese young adults struggling with NSSI in more effective ways.

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# 探討情緒失調在父母依附與無自殺意圖之自傷行為的中介效果：以臺灣某私立大學生為例的橫斷性研究

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研究目的：本研究旨在探討情緒失調對於台灣大學生的父母依附和自傷行為的中介角色。研究方法：研究對象為399位大學生，平均年齡為20.35歲。透過網路問卷的方式施測，填寫測量父母依附、情緒失調與自傷行為的量表。研究結果：以結構方程模式驗證，研究結果指出父母依附與情緒失調皆與自傷行為有直接關聯性，且情緒失調在父母依附及自傷行為間具有部分中介效果。研究結果亦發現有18%的受試者自陳過去一年曾有過自我傷害行為。研究結論：台灣大學生的自我傷害行為是需要關注的重要議題。研究結果顯示，針對台灣大學生的自傷行為的預防與介入策略上，著重於情緒失調應會有助益。

關鍵詞：父母依附、臺灣大學生、情緒失調、無自殺意圖的自我傷害行為。

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## **Online Supplementary Materials for:**

**Examining the Mediating Effects of Emotion Dysregulation in the Association Between Attachment with Parents and Non-Suicidal Self-Injury: A Cross-Sectional Study Among Undergraduate Students in a Private University in Taiwan**

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Table S1

*The Chinese version of the DERS*

題號	題目	幾乎沒有	有時候	大約一半	大部分是	幾乎總是
1.	我清楚我的感受是什麼。	1	2	3	4	5
2.	我會去注意我感受到什麼。	1	2	3	4	5
3.	我會經驗到難以承受的情緒而且會失控。	1	2	3	4	5
4.	我不知道我的感受是什麼。	1	2	3	4	5
5.	我很難理解我的感受代表什麼。	1	2	3	4	5
6.	我會注意我的感受。	1	2	3	4	5
7.	我能很精確的知道我的感受是什麼。	1	2	3	4	5
8.	我在意我感受到什麼。	1	2	3	4	5
9.	我對於我的感受覺得困惑。	1	2	3	4	5
10.	當我苦惱時，我會承認我有這個情緒。	1	2	3	4	5
11.	當我苦惱時，我會對於自己這樣的感受覺得生氣。	1	2	3	4	5
12.	當我苦惱時，我會對於這樣的狀態感到很困窘。	1	2	3	4	5
13.	當我苦惱時，我很難把事情做完。	1	2	3	4	5
14.	當我苦惱時，我會感到失控。	1	2	3	4	5
15.	當我苦惱時，我相信我會這樣持續很久。	1	2	3	4	5
16.	當我苦惱時，我相信到了最後我會感到非常憂鬱。	1	2	3	4	5
17.	當我苦惱時，我相信我的感受是有根據而且重要的。	1	2	3	4	5
18.	當我苦惱時，我很難專心在其他事上。	1	2	3	4	5
19.	當我苦惱時，我會開始失控。	1	2	3	4	5
20.	當我苦惱時，我仍然能夠把事情做完。	1	2	3	4	5

Table S1

## The Chinese version of the DERS

題號	題目	幾乎沒有	有時候	大約一半	大部分是	幾乎總是
21.	當我苦惱時，我會對於我自己有這樣的感受感到羞愧。	1	2	3	4	5
22.	當我苦惱時，我知道我能夠找到方法讓自己後來感覺好一些。	1	2	3	4	5
23.	當我苦惱時，我覺得好像我是軟弱的。	1	2	3	4	5
24.	當我苦惱時，我覺得我好還是可以控制我的行為。	1	2	3	4	5
25.	當我苦惱時，我對於自己有這樣的感受感到罪惡。	1	2	3	4	5
26.	當我苦惱時，我很難集中注意力。	1	2	3	4	5
27.	當我苦惱時，我很難控制我的行為。	1	2	3	4	5
28.	當我苦惱時，我相信我沒辦法做些什麼來讓自己感覺好一些。	1	2	3	4	5
29.	當我苦惱時，我對於我自己有這樣的感受感到煩躁。	1	2	3	4	5
30.	當我苦惱時，我會開始感到我自己非常糟糕。	1	2	3	4	5
31.	當我苦惱時，我相信我所能做的就是沉溺其中。	1	2	3	4	5
32.	當我苦惱時，我會對我的行為失去控制。	1	2	3	4	5
33.	當我苦惱時，我很難思考任何其他的事情。	1	2	3	4	5
34.	當我苦惱時，我會花時間去想出我真正感受到了什麼。	1	2	3	4	5
35.	當我苦惱時，我需要比較久的時間才會感覺好一些。	1	2	3	4	5
36.	當我苦惱時，我感到情緒強烈到無法抵抗。	1	2	3	4	5

Note. The Chinese version of the DERS (Lu, 2007).

Table S2

*The Chinese version of the IPPA-Parent*

題號	題目	不曾 這樣	很少 這樣	有時 這樣	常常 這樣	總是 這樣
1.	我的父母尊重我的感受。	1	2	3	4	5
2.	我覺得我的父母是稱職的父母。	1	2	3	4	5
3.	我希望有不一樣的父母親。	1	2	3	4	5
4.	我父母接納我就是這樣的人。	1	2	3	4	5
5.	當我有需要解決的問題時，我通常只能依靠我自己，不能依靠我父母。	1	2	3	4	5
6.	在我關心的事情上，我會詢問父母的意見。	1	2	3	4	5
7.	讓我的父母知道我的真實感受是沒有用的。	1	2	3	4	5
8.	單我難過傷心時，我的父母可以感受到。	1	2	3	4	5
9.	和父母談論我的問題，會讓我感到丟臉或愚蠢。	1	2	3	4	5
10.	我父母對我期待太高。	1	2	3	4	5
11.	在家裡，我很容易覺得心煩或沮喪。	1	2	3	4	5
12.	我的沮喪是超乎父母所能解的。	1	2	3	4	5
13.	討論事情時，父母會在乎我的想法。	1	2	3	4	5
14.	我的父母信任我的判斷能力。	1	2	3	4	5
15.	我父母有他自己的困擾，所以我不會拿自己的問題去打擾他。	1	2	3	4	5
16.	我的父母能幫我更了解自己。	1	2	3	4	5
17.	我會告訴父母我的問題和困擾。	1	2	3	4	5
18.	我對我父母的感覺是生氣的。	1	2	3	4	5
19.	我在家是不被父母注意的。	1	2	3	4	5

Table S2

*The Chinese version of the IPPA-Parent*

題號	題目	不曾 這樣	很少 這樣	有時 這樣	常常 這樣	總是 這樣
20.	我父母鼓勵我說出我的困難。	1	2	3	4	5
21.	我的父母了解我。	1	2	3	4	5
22.	我不知道我可以依靠誰。	1	2	3	4	5
23.	當我對一些事情感到憤怒時，我的父母會試著了解。	1	2	3	4	5
24.	我信任我的父母。	1	2	3	4	5
25.	我的父母不知道這陣子我怎麼過的。	1	2	3	4	5
26.	當我需要排出心中的疑慮時，我可以依靠我的父母。	1	2	3	4	5
27.	我覺得沒有人了解我。	1	2	3	4	5
28.	如果父母知道我正因為某事心煩，他會問我關於這件事情。	1	2	3	4	5

*Note.* The Chinese version of the IPPA-Parent (Tseng, 2009).

**Table S3***Estimates and Mediation Effects Modeled with Zero-Inflated Count Variables*

Effect	Estimate	95% CI	<i>p</i>
Total effect	6.33	2.46 to 11.27	< .001
Indirect effect	2.36	0.87 to 4.42	< .001
Direct effect	3.96	1.21 to 7.34	< .001
Prop. Mediated	0.37	0.21 to 0.54	< .001

*Note.* Prop. Mediated = the ratio of the indirect effect to the total effect.

**Table S4***Factor Loadings for the Measurement Model*

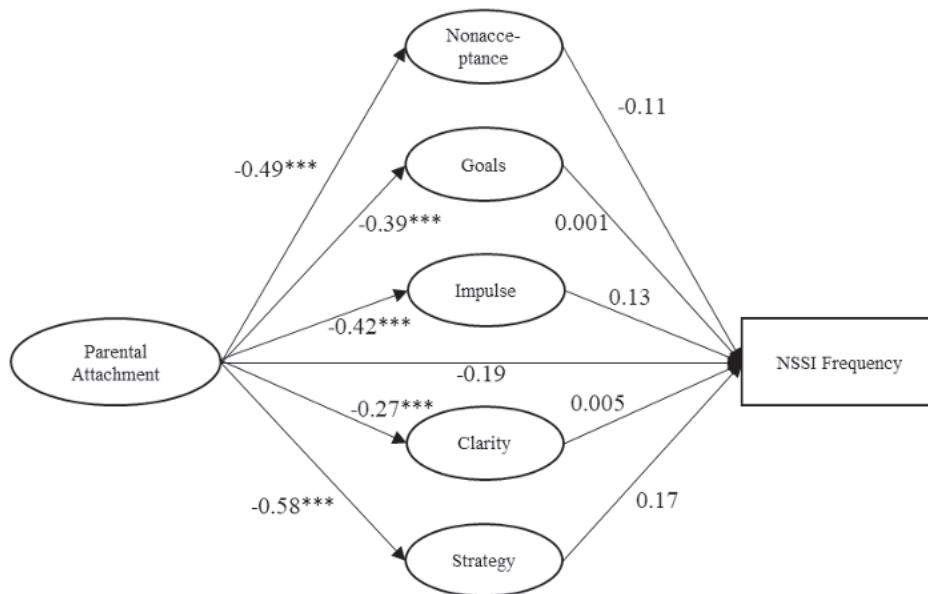
Measure and variable	Unstandardized			Standardized
	Factor loading	<i>SE</i>	<i>Z</i>	factor loading
Parental attachment				
Parent trust	3.804	0.619	6.148	0.967***
Parent communication	2.642	0.313	8.456	0.935***
Parent Closeness	2.861	0.347	8.24	0.944***
Emotion dysregulation				
Nonacceptance	1.892	0.213	8.865	0.884***
Goals	0.945	0.087	10.857	0.687***
Impulse	1.235	0.113	10.95	0.777***
Strategy	7.866	8.988	0.875	0.992
Clarity	0.645	0.081	7.933	0.542***
Awareness	-0.052	0.057	-0.913	-0.052

*Note.* *N* = 399.

\* *p* < .05; \*\* *p* < .01; \*\*\* *p* < .001.

**Figure S1**

*The SEM model exploring the mediating role of facets of emotion dysregulation in the association between attachment with parents and NSSI frequency.*



*Note.* Sex is controlled as covariates but not shown.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .