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ORIGINAL ARTICLE

# Cognitive Factors Analysis of Persistent Non-suicidal Self-injury from Secondary School to University: a Short-Term Longitudinal Study

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**Abstract**
Previous research has found correlations between outcome expectancies, self-efficacy to resist, and the occurrence of non-suicidal self-injury. However, it remains unclear whether these factors are associated with the persistence of self-injury. Based on social cognitive theory, this study aims to investigate the roles of outcome expectancies and self-efficacy to resist non-suicidal self-injury in the process of individuals engaging in persistent self-injury after transitioning into the college environment. A two-wave survey was conducted at a 6-month interval using self-report questionnaires to investigate 161 first-year college students with a history of self-injury in the past year. 21.7% of freshmen continued engaging in self-injury. There were significant differences in communication expectancies scores in outcome expectancies between those who continued and those who did not continue self-injury. Affect regulation expectancies in outcome expectancies positively predicted persistent self-injury, while communication expectancies in outcome expectancies negatively predicted persistent self-injury. Self-efficacy to resist self-injury moderated the relationship between pain expectancies and negative self-belief expectancies in predicting persistent self-injury. When self-efficacy to resist self-injury was low, pain expectancies significantly negatively predicted persistent self-injury. When self-efficacy to resist self-injury was high, negative self-belief expectancies significantly negatively predicted persistent self-injury. This study highlights the importance of considering relevant cognitive factors in the prevention and intervention of persistent self-injury.

**Keywords** Social cognitive theory · Outcome expectancies · Self-efficacy to resist · Non-suicidal self-injury · Persistence

Non-suicidal self-injury (NSSI) encompasses the deliberate self-harming behaviors undertaken without the intention of ending one's own life, and it is an act that deviates from social norms (Klonsky, 2011). The primary manifestations of NSSI include scratching skin, self-cutting, hair pulling, and self-hitting, with self-cutting emerging as the predominant

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form (Halpin & Duffy, 2020). NSSI typically initiates during early adolescence (Brown & Plener, 2017), with adolescents being identified as a high-risk population for engaging in such behavior (Nock, 2010). Nevertheless, it is observed that a proportion of individuals discontinue engaging in NSSI as they enter late adolescence or early adulthood (Plener et al., 2015).

Recent studies have revealed a significant prevalence of NSSI among Chinese university students, with rates estimated to be approximately 20% (Chen et al., 2022; Wong & Chung, 2021). The findings of high NSSI prevalence among Chinese university students, who are typically in late adolescence or early adulthood, suggest that a portion of individuals persist in engaging in NSSI beyond the adolescent years (Kiekens et al., 2017). One of the distinguishing features of transitioning from secondary school to university is the expanded array of opportunities presented in the academic, personal, and social domains of life (Arnett, 2014). The presence of self-harm among university students can lead to various negative consequences, including a decline in academic performance, the development of emotional disorders, increased suicidal ideation, and potentially even engagement in suicidal behaviors (Kiekens et al., 2016, 2018, 2019). Therefore, understanding the reasons behind the persistent NSSI among university students is crucial in developing targeted intervention strategies and mitigating the negative impacts associated with these behaviors.

Numerous theories have been proposed to explain self-injury, such as the experiential avoidance model (Chapman et al., 2006), the emotion cascade model (Selby & Joiner, 2009), and the integrated model (Nock, 2009). These theories highlight the significance of emotional experience and regulation in the development and maintenance of NSSI behaviors (Nock & Prinstein, 2004). However, the cognitive-emotional model of NSSI suggests that solely focusing on an individual's emotional experiences and emotion regulation abilities may not provide a complete understanding of the relationship with NSSI. It is crucial to consider the role of specific core beliefs and cognitions associated with NSSI as well (Hasking et al., 2017). Outcome expectations and self-efficacy, as proposed by the social cognitive theory, are believed to have a significant correlation with NSSI (Dawkins et al., 2021).

Hasking and Boyes (2018) have classified NSSI outcome expectancies into five categories: affect regulation, communication, negative social outcomes, pain, and negative self-belief expectancies. The first two categories pertain to positive expectations of self-injury outcomes, whereas the last three categories pertain to negative expectations of self-injury outcomes. In other words, if individuals hold the belief that engaging in self-injury will result in positive outcomes, they are more inclined to engage in such behavior. Conversely, if they believe that self-injury will lead to negative outcomes, they are more likely to decrease their engagement in that behavior. This concept is similar to the idea of negative outcome expectancies for behaviors like smoking or drinking, which can aid in quitting those behaviors (Hasking & Oei, 2002; Van Zundert et al., 2009). Aligned with research conducted in other domains, multiple cross-sectional studies have consistently demonstrated that positive outcome expectancies for NSSI, such as viewing NSSI as a method of emotional regulation, are linked to heightened involvement in NSSI. On the other hand, maintaining negative outcome expectancies, such as the belief that NSSI will lead to physical pain, is linked to reduced involvement in NSSI (Dawkins et al., 2019). In the context of this study, the transition from secondary school to higher education institutions poses a significant challenge for students, particularly in terms of the pressure they experience in the new environment (Garett et al., 2017). This issue gains particular importance when considering students who have a previous history of self-harm and exhibit a higher positive expectation and lower negative expectation regarding engaging in self-injurious behavior.

It is plausible that these students would be more inclined to resort to familiar NSSI behaviors as a coping mechanism to deal with the pressures they face during this transition.

General self-efficacy refers to an individual's overarching belief in their ability to overcome obstacles and achieve goals in various aspects of life. In contrast, refusal self-efficacy is a more specific form of self-efficacy that focuses on one's confidence in resisting a particular behavior (Bandura, 1989; Bandura et al., 1999). Research suggests that individuals who possess higher levels of refusal self-efficacy regarding smoking, alcohol consumption, and drug use are less likely to engage in these behaviors in the future (Gwaltney et al., 2009; Kadden & Litt, 2011; Oei et al., 2009). Self-efficacy to resist NSSI refers to an individual's level of self-confidence in their ability to effectively prevent themselves from engaging in self-injury behaviors in the future. Research suggests that individuals who possess a strong belief in their capacity to refrain from NSSI are less likely to engage in such behaviors. Conversely, lacking confidence in resisting the urge to engage in NSSI acts as a risk factor for NSSI (Dawkins et al., 2019, 2021; Hasking, 2017). Individuals who persist in engaging in NSSI behaviors may face challenges in stopping due to a reduced resistance to NSSI. Research suggests that those who continue self-injury have a lower sense of refusal self-efficacy compared to those who have successfully ceased self-harming behaviors (Gray et al., 2022). Consequently, during the transition from high school to college, new students with a history of self-injury are more prone to continue self-harming if they are unable to resist the allure of NSSI.

Additionally, the likelihood of participating in a specific behavior decreases when there is an acknowledgment of the potential advantages but a lack of ability to achieve it, as well as when there is a belief in one's capability but a perception that it will not result in favorable outcomes. This indicates that outcome expectations and self-efficacy frequently interact in real-life situations (Bandura, 1989). Research also suggests that the interaction between NSSI outcome expectations and refusal self-efficacy is a significant predictor of NSSI (Dawkins et al., 2021). When individuals believe that NSSI will lead to positive outcomes and also have doubts about their ability to resist the urge to engage in NSSI, the likelihood of NSSI occurrence increases. According to the social cognitive theory (Bandura, 1989) and relevant research on NSSI (Dawkins et al., 2019, 2021), it is crucial to explore the combined impact of outcome expectations and refusal self-efficacy. Therefore, one of the objectives of this study is to investigate whether this interaction exists as a predictor of persistent NSSI.

## The Present Study

Although previous research has shown a relationship between NSSI outcome expectations, refusal self-efficacy, and NSSI, most of these studies have been cross-sectional, leaving it unclear whether these factors and their interaction can predict continued engagement in NSSI over time. This study utilized a longitudinal design and focused on freshmen as participants to investigate whether certain cognitive factors associated with NSSI have predictive value in determining persistent NSSI behaviors. This study puts forward the hypothesis that positive outcome expectations in NSSI outcome expectancy have a positive predictive effect on persistent NSSI, whereas negative outcome expectations have a negative predictive effect on persistent NSSI. Additionally, self-efficacy to resist NSSI is predicted to have a negative effect on persistent NSSI. Furthermore, there is an interaction effect between NSSI outcome expectations and self-efficacy in predicting persistent NSSI.

## Method

### Participants and Procedure

The sample collection for this study was conducted in two stages. In the first stage, a questionnaire survey was administered in September 2022 to 900 freshmen at a university in Sichuan Province, China. A total of 798 complete responses were obtained, resulting in a response rate of 87%. At baseline (Time 1), demographic information, NSSI status, NSSI outcome expectations, and refusal self-efficacy were collected from the participants. In the second stage, a follow-up survey was conducted after 6 months among 183 students who had engaged in NSSI at least once in the past year. At follow-up (Time 2), NSSI status was assessed again, and 161 participants completed the survey, resulting in a response rate of 87.97%.

All participants are required to complete the questionnaire anonymously by providing only the last five digits of their student ID and a valid email address. The last five digits of the student ID will be used to match the data from two questionnaires, while the email address will be used to send the questionnaire link. This study has received approval from the Ethics Committee of North Sichuan Medical College, and informed consent has been obtained from all participants. After completing each survey, participants were informed about available psychological support resources and encouraged to seek help if they experienced any psychological discomfort.

### Measures

#### NSSI Outcome Expectancies

The outcome expectancy of self-injury was measured using the NSSI Outcome Expectancy Scale, which was developed by Hasking and Boyes (2018). The scale consists of five dimensions measuring five types of outcome expectancies related to self-injury, including affect regulation expectancies (e.g., I would feel calm), negative social outcome expectancies (e.g., My family would be disgusted), communication expectancies (e.g., Other people would notice and offer sympathy), pain expectancies (e.g., I would feel physical pain), and negative self-belief expectancies (e.g., I would feel numb). There are 25 items in total, with five questions for each dimension rated on a 4-point scale from "Extremely unlikely" to "Somewhat unlikely," "Somewhat likely," and "Extremely likely." The scale was only administered at the first measurement, so reliability coefficients for the first time point were reported. In the current sample: affect regulation $\alpha = 0.82$; negative social outcomes $\alpha = 0.69$; communication expectancies $\alpha = 0.65$; pain expectancies $\alpha = 0.78$; and negative self-belief expectancies $\alpha = 0.70$.

#### Self-efficacy to Resist NSSI

The self-efficacy to resist NSSI scale was adapted from a study on self-efficacy to resist suicide (Czyz et al., 2014), which has been demonstrated to be feasible by previous research (Dawkins et al., 2021). All items were modified by replacing "suicide" with "self-injury," such as "How certain are you that you will not engage in self-injury in the future?" The scale consists of six items rated on a 6-point Likert scale ranging from 1

(very uncertain) to 6 (very certain), with higher scores indicating greater likelihood of resisting NSSI in the future. The scale was administered only once, so the reliability coefficient for the first time point is reported. The $\alpha$-coefficient for this scale in this survey was 0.88.

### Non-suicidal Self-injury

The NSSI assessment scale was used to measure participants' self-harming behaviors, which was developed by You et al. (2013). The scale includes seven items, such as self-cutting, burning, biting, and punching. In the first stage of data collection, participants were asked to report the number of occurrences of each item in the past 12 months, and in the second stage, they were asked to report the number of occurrences in the past 6 months of the semester. If participants answer "yes" to at least one item, it is considered to indicate engagement in self-harming behavior, and the variable is encoded as binary. If self-harming behavior is reported in both surveys, it indicates the presence of persistent NSSI in the participants. The scale has shown good reliability and validity in previous research (You & Lin, 2015).

### Data Analyses

Descriptive statistics, difference testing, and logistic regression analysis were conducted using SPSS 24.0 to analyze the data. In this study, independent sample *t*-tests were used to compare the differences in the five dimensions of NSSI outcome expectancy and refusal self-efficacy between freshmen who engaged in persistent NSSI and those who did not engage in persistent NSSI. The means and standard deviations of the data were reported. To examine the predictive effects of NSSI outcome expectations, refusal self-efficacy, and their interaction on persistent NSSI, logistic regression analysis was conducted. Furthermore, the process analysis was utilized to explore the simple effects in the moderation effects. We established three models to test the hypotheses of this study. Each of these models examines the predictive effects of NSSI outcome expectations, refusal self-efficacy, and the interaction between the two on persistent NSSI. Given that previous research has shown significant associations between gender, left-behind experience (children under the age of 18 who stayed in the place of household registration for half a year or more and could not live with both parents while growing up because both parents or one of them work in other cities), family monthly income, and NSSI (Wu & Liu, 2019; Zhou et al., 2022), all models controlled for these three variables.

## Results

### Preliminary Analyses

The data collected from the baseline survey revealed that out of the 798 students, 183 (22.93%) reported engaging in NSSI in the past year. Among these participants, 161 students took part in the second survey. The data from the second survey indicated that 35 students had persistent NSSI during the first semester of their freshman year, resulting in a persistent NSSI rate of 21.7%. The age of the freshmen ranged from 17 to 19 years old ($M = 18.04$, $SD = 0.74$). Table 1 presents the basic information of

**Table 1** Descriptive statistics of baseline and followed-up data

| | Baseline | Followed-up | |
|---|---|---|---|
| | All sample ($N=161$) | Persistent NSSI ($N=35$) | Non-persistent NSSI ($N=126$) |
| Demographics, *n* (%) | | | |
| Male/female | 48 (29.8)/113 (70.2) | 9 (25.7)/26 (74.3) | 39 (31.0)/87 (69.0) |
| Only child/not only child | 68 (42.2)/93 (57.8) | 18 (51.4)/17 (48.6) | 50 (39.7)/76 (60.3) |
| From urban/rural area | 78 (48.4)/83 (51.6) | 21 (60.0)/14 (40.0) | 57 (45.2)/69 (54.8) |
| With religious beliefs/without religious beliefs | 12 (7.5)/149 (92.5) | 2 (5.7)/33 (94.3) | 10 (7.9)/116 (92.1) |
| Han nationality/minority nationality | 149 (92.5)/12 (7.5) | 34 (97.1)/1 (2.9) | 115 (91.3)/11 (8.7) |
| Left-behind experience/no left-behind experience | 78 (48.5)/83 (51.5) | 18 (51.4)/17 (48.6) | 60 (47.6)/66 (52.4) |
| Monthly household income≤5000 yuan/>5000 yuan | 45 (28.0)/116 (72.0) | 12 (34.3)/23 (65.7) | 33 (26.2)/93 (73.8) |
| Parents together/parents divorced | 135 (83.9)/26 (16.1) | 31 (88.6)/4 (11.4) | 104 (82.5)/22 (17.5) |
| Self-harm methods, *n* (%) | | | |
| Cutting | 39 (24.2) | 6 (17.1) | |
| Burning | 8 (4.9) | 0 | |
| Biting | 58 (36.0) | 8 (22.9) | |
| Hitting | 38 (23.6) | 4 (11.4) | |
| Scratching | 84 (52.1) | 21 (60.0) | |
| Inserting objects under nails | 33 (17.4) | 5 (14.3) | |
| Banging body parts against walls | 83 (51.5) | 16 (45.7) | |

**Table 2** Correlations, means, and standard deviations of all variables ($N = 161$)

| | M(SD) | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Persistent NSSI | - | 0.11 | −0.11 | −0.15* | −0.11 | −0.14 | −0.08 |
| 2. Affect regulation expectancies | 10.01 (3.63) | - | 0.05 | 0.41*** | −0.35*** | 0.01 | −0.52*** |
| 3. Negative social outcome expectancies | 13.82 (3.19) | | - | 0.16* | 0.27*** | 0.46*** | 0.02 |
| 4. Communication expectancies | 9.20 (2.81) | | | - | −0.16* | 0.21** | −0.16* |
| 5. Pain expectancies | 16.27 (3.11) | | | | - | 0.26*** | 0.35*** |
| 6. Negative self-belief expectancies | 11.21 (3.49) | | | | | - | 0.05 |
| 7. Self-efficacy to resist NSSI | 23.08 (6.98) | | | | | | - |

***$p < 0.001$,**$p < 0.01$,*$p < 0.05$

**Table 3** Differential analysis of specific cognitive beliefs in NSSI

| | Persistent NSSI ($N = 35$) *M* (CI) | Non-persistent NSSI ($N = 126$) *M* (CI) | *T* | Cohen's *d* |
|---|---|---|---|---|
| Affect regulation expectancies | 10.8 (9.5,12.1) | 9.7 (9.1,10.4) | −1.4 | −0.30 |
| Negative social outcome expectancies | 13.1 (11.9,14.1) | 14.0 (13.4,14.5) | 1.4 | 0.28 |
| Communication expectancies | 8.3 (7.5,9.1) | 9.4 (8.9,9.9) | 1.9* | 0.41 |
| Pain expectancies | 15.6 (14.5,16.6) | 16.4 (15.9,16.9) | 1.4 | 0.26 |
| Negative self-belief expectancies | 10.2 (9.1,11.4) | 11.4 (10.8,12.1) | 1.8 | 0.34 |
| Self-efficacy to resist NSSI | 21.9 (19.1,24.6) | 23.3 (22.2,24.6) | 1.1 | 0.19 |

*$p < 0.05$

these participants. Furthermore, the most prevalent forms of self-injury among these freshmen, both during the baseline period and follow-up period, were scratching the skin and banging their bodies against walls. On the other hand, the least frequently employed method of self-harm was burning oneself.

The bivariate correlation can be found in Table 2, which displays the significant relationships between the continuous variables. In addition, to examine the differences in NSSI-related cognitive beliefs between individuals with persistent NSSI and those without persistent NSSI, independent samples *t*-tests were conducted in this study. The findings revealed that freshmen who persistently engage in NSSI had lower scores in communication, negative social outcomes, pain, and negative self-belief expectancies and self-efficacy to resist NSSI when compared to freshmen who did not engage in persistent NSSI. Conversely, those who engaged in persistent NSSI scored higher in affect regulation expectancies. However, the statistical analysis revealed that the differences between the two groups were only significant in the dimension of communication expectancies ($p < 0.05$). Additionally, there was a marginally significant difference in the dimension of negative self-belief expectancies($p = 0.06$). See Table 3 for specific results.

### Predictive Role of Specific Cognitive Beliefs in the Occurrence of Persistent NSSI

To test whether specific cognitions related to NSSI can predict persistent NSSI, three models were constructed to examine our hypotheses. Data analysis was conducted using logistic regression models. NSSI outcome expectancies, self-efficacy, and their interaction terms were entered into the model after controlling for gender, left-behind experience, and monthly family income. The results, as shown in Table 4, indicated that affect regulation expectancies positively predicted persistent NSSI, while communication expectancies negatively predicted persistent NSSI.

In addition, self-efficacy to resist NSSI can play a moderating role in the relationship between pain expectancies and persistent NSSI, as well as the relationship between negative self-belief expectancies and persistent NSSI. The interaction term pain × self-efficacy significantly predicts the probability of persistent NSSI. Specifically (Fig. 1), when self-efficacy is high, there is a positive effect of pain expectations on the probability of persistent NSSI, although this effect is not statistically significant ($b=0.47$, $z=1.26$, $p>0.05$). However, when self-efficacy is low, pain expectations negatively predict the probability of persistent NSSI, and this effect just reaches the level of statistical significance ($b=-0.59$, $z=-1.96$, $p<0.05$). Negative self-belief × self-efficacy significantly predicts the probability of persistent NSSI. Simple slope analysis reveals (Fig. 2) that only at high levels of self-efficacy, negative self-belief expectations significantly negatively predict persistent NSSI (low efficacy, $b=-0.01$, $z=-0.06$, $p>0.05$; high efficacy, $b=-0.82$, $z=-2.59$, $p<0.01$).

## Discussion

Based on social cognitive theory, this study is the first to investigate the relationship between outcome expectations, refusal self-efficacy, and persistent NSSI using a longitudinal approach. This study found that stronger outcome expectations related to emotion regulation significantly increase the likelihood of freshmen engaging in persistent NSSI behavior during their first semester, while communication expectations decrease the probability of persistent NSSI. Additionally, the study revealed that self-efficacy to resist NSSI can moderate the relationship between pain expectancies, negative self-belief expectancies, and the occurrence of persistent NSSI.

This study's descriptive data showed that 22.93% of university freshmen had engaged in NSSI at least once in the past year (during their senior year in high school), and among those students with such a history, 21.7% continued during their first semester of university, verifying that some adolescents continue to self-injure into adulthood (Kiekens et al., 2017). Persistent self-injury not only harms individuals physically, but also leads to higher levels of emotional suppression in individuals who continue to self-injure compared to those who have stopped (Andrews et al., 2013) and lower self-esteem and life satisfaction (Rotolone & Martin, 2012). Therefore, university educators and mental health workers should pay more attention to these students who continue to self-injure.

According to the findings of this study, individuals who hold the belief that NSSI can effectively regulate their emotions are more likely to engage in persistent NSSI. This finding is consistent with previous cross-sectional research (Dawkins et al., 2021) and further reinforces the central role of emotion regulation in sustaining self-injurious behaviors (Nock & Prinstein, 2004). It is crucial to consider the stressors associated with the

**Table 4** Logistic regression of specific cognitive beliefs on persistent NSSI

| Variables | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | *B* | *OR* (95% CI) | *B* | *OR* (95% CI) | *B* | *OR* (95% CI) |
| Affect regulation expectancies | 0.44* | 1.55 (1.0,2.3) | 0.45 | 1.56 (0.9,2.4) | 0.43 | 1.54 (0.9,2.5) |
| Negative social outcome expectancies | −0.08 | 0.92 (0.5,1.5) | −0.07 | 0.92 (0.5,1.5) | −0.13 | 0.87 (0.5,1.5) |
| Communication expectancies | −0.64* | 0.52 (0.3,0.8) | −0.64* | 0.52 (0.3,0.8) | −0.55 | 0.57 (0.3,1.0) |
| Pain expectancies | −0.14 | 0.86 (0.5,1.3) | −0.14 | 0.86 (0.5,1.3) | −0.05 | 0.94 (0.5,1.5) |
| Negative self-belief expectancies | −0.18 | 0.83 (0.5,1.3) | −0.18 | 0.83 (0.5,1.3) | −0.24 | 0.77 (0.4,1.3) |
| Self-efficacy to resist NSSI | | | 0.02 | 1.01 (0.6,1.6) | 0.10 | 1.10 (0.5,2.1) |
| Affect regulation × self-efficacy to resist NSSI | | | | | −0.02 | 0.97 (0.6,1.5) |
| Negative social × self-efficacy to resist NSSI | | | | | 0.01 | 1.01 (0.5,1.8) |
| Communication × self-efficacy to resist NSSI | | | | | 0.52 | 1.69 (0.9,3.0) |
| Pain×self-efficacy to resist NSSI | | | | | 0.54* | 1.72 (1.0,2.7) |
| Negative self-belief × self-efficacy to resist NSSI | | | | | −0.46* | 0.63 (0.4,0.9) |
| Nagelkerke $R^2$ | 0.12 | | 0.12 | | 0.23 | |

*$p < 0.05$

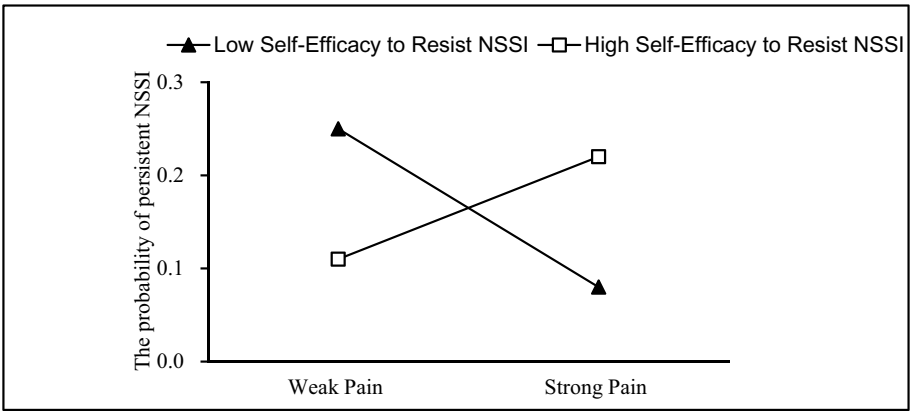


**Fig. 1** Moderating effect of self-efficacy to resist NSSI on the relationship between pain expectancies and persistent NSSI

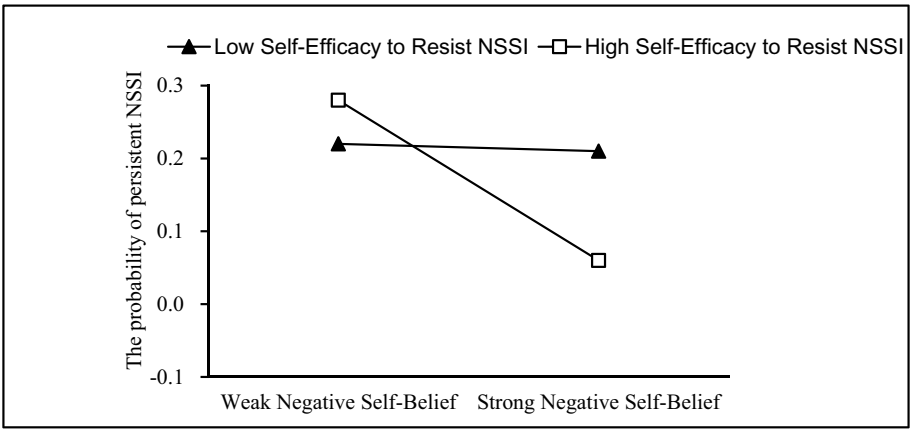


**Fig. 2** Moderating effect of self-efficacy to resist NSSI on the relationship between negative self-belief expectancies and persistent NSSI

transition to tertiary education, as it is a well-known challenge for freshmen. The process of adapting to a new academic and social environment can place a significant burden on students in terms of emotion regulation (He et al., 2022). Consequently, they may actively seek coping mechanisms that they perceive to be effective. For individuals who believe that self-injury can effectively regulate their emotions, this may result in a higher likelihood of persistent self-injury during the first semester. The combination of transition stress and the belief in the efficacy of self-injury as an emotion regulation strategy may contribute to an increased risk of ongoing self-injury among freshmen.

The association between emotion regulation expectancies and persistent NSSI loses its significance when perceived self-efficacy and the interaction term are included. This finding diverges from prior research, and two potential explanations can be considered. Firstly, there may exist a high correlation and shared variance between emotion regulation expectancies and refusal self-efficacy, as indicated by the correlations observed in this study, as

well as consistent findings in other studies (Dawkins et al., 2019, 2021). It is easy to understand that the more tempting a behavior is, the more difficult it may be for us to resist it. This is why individuals may have lower confidence in resisting the urge for self-harm when they perceive it as an effective means of emotional regulation. Secondly, unlike previous studies, this investigation did not incorporate psychological distress as a control variable, which could have implications for the relationships between the variables.

Having weaker communication expectancies is associated with persistent NSSI, which is consistent with previous research showing that adolescents who use NSSI for interpersonal purposes are more likely to stop NSSI in adulthood (Gelinas & Wright, 2013; Halpin & Duffy, 2020). This may be because interpersonal relationships can become complex in adolescence, which could be difficult for teenagers to deal with. As a result, they tend to seek solutions from NSSI (Halpin & Duffy, 2020). As adolescents enter adulthood, their social interactions gradually stabilize (Whitlock et al., 2015), meaning that those who expect using NSSI to gain attention may gradually reduce NSSI. Studies have also found that NSSI patients who rely on interpersonal relationship functions will gradually lose the intention of NSSI after leaving uncomfortable relationships (Hambleton et al., 2020). On the other hand, with the increased uncertainty surrounding the transition from secondary to tertiary study, the reliability of using NSSI as a means of communication may diminish in this new context, thereby reducing the likelihood of NSSI based on this expectation. Therefore, it is likely that freshmen who have high communication expectations are less likely to engage in persistent NSSI behaviors due to the new social environment.

This study discovered that the self-efficacy to resist NSSI can moderate the relationship between pain expectations and persistent NSSI. For freshmen with low confidence in resisting NSSI, the expectation of physiological pain caused by self-injury can reduce the likelihood of persistent NSSI in the future, but such expectancy has no significant impact when the confidence is high. The reason for this could be that freshmen who lack confidence in resisting NSSI are more likely to engage in persistent NSSI. As pain expectations increase, the likelihood of persistent NSSI decreases to a greater extent. On the other hand, individuals who have confidence in resisting NSSI are less likely to engage in persistent NSSI, and in such cases, the influence of pain expectations is relatively smaller.

Additionally, the self-efficacy to resist NSSI strengthens the predictive ability of negative self-belief expectancies on persistent NSSI. For those who have confidence in their ability to resist NSSI, negative self-belief expectancies can decrease the likelihood of persistent NSSI in the future. This is consistent with the hypothesis of social cognitive theory (Bandura, 1989; Dawkins et al., 2019), which suggests that in real life, outcome expectancies often combine with efficacy expectancies to influence behavioral choices. When there is a negative outcome expectancy for a certain behavior and an ability to resist it, participation can be less likely. Indeed, research has shown that when individuals with NSSI begin to view it as troublesome in their lives, they are more likely to stop engaging in it (Whitlock et al., 2015). This work also showed that individuals with negative self-belief expectancies are less likely to continue NSSI in the future.

## Implications

The conclusions of this study hold significant reference value for intervention and prevention of NSSI among college students. Firstly, the research indicates that adjusting college students' expectations for emotional regulation regarding NSSI may be instrumental in ceasing persistent non-suicidal self-injury. While non-suicidal self-injury may serve as a

short-term mechanism for emotional regulation among self-harmers, over time, it can lead to a deterioration of individuals' emotional well-being (Koenig et al., 2021). Therefore, providing training to college students who engage in persistent self-harming behaviors to enhance their understanding of this phenomenon can aid in halting non-suicidal self-injury (McEvoy et al., 2017). Additionally, identifying students' preferred methods of emotional regulation can help prevent non-suicidal self-injury. Counselors and mental health workers should offer students alternative strategies for emotional regulation, thereby reducing their reliance on NSSI as a coping mechanism for negative emotions. Secondly, it is crucial to identify the expectations of pain associated with NSSI among college students who lack confidence in resisting non-suicidal self-injury. By emphasizing the physiological pain involved, we can contribute to the reduction of persistent NSSI. Lastly, for self-harmers who are confident in resisting NSSI, highlighting the difficulties and negative emotions associated with non-suicidal self-injury may prove more effective in preventing persistent self-harm behaviors.

### Limitations and Future Research

The main strength of this study lies in its utilization of a longitudinal design, which overcomes the limitations of cross-sectional designs. However, there are still some limitations to consider. Firstly, the relatively small sample size limits the ability to statistically test the conclusions drawn from this study, particularly in the case of Model 3, which involves 11 variables. With only 161 participants, the sample size may only just reach an acceptable level of statistical power. Secondly, the consistency coefficient of the communication expectancy scale in this study is 0.65, which is at a marginal level. Given the significance of this variable in the study, this limitation should also be recognized as one of the research's constraints. Furthermore, this study did not include psychological distress variables, as previous studies have done, which may hinder the ability to make cross-sectional comparisons. In future research, it is recommended to incorporate psychological distress variables to reassess the impact of cognition on persistent NSSI. Lastly, this study only conducted a short-term longitudinal tracking, which may hinder the discovery of more comprehensive evidence. It would be beneficial to extend the tracking period in future research to broaden the conclusions drawn from this study.

## Conclusions

The affect regulation expectancies in outcome expectations increase the likelihood of persistent NSSI among freshmen during the first semester, whereas communication expectancies decrease the likelihood of persistent NSSI. The self-efficacy to resist NSSI can moderate the relationship between pain expectancies, negative self-belief expectancies, and persistent NSSI. Interventions for NSSI among college students should prioritize addressing core cognitions and beliefs associated with NSSI, as this may prove beneficial in preventing persistent NSSI.

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**Data Availability** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## Declarations

**Ethics Approval** This study was approved by the Ethics Committee of North Sichuan Medical College.

**Consent to Participate** Written informed consent was obtained from participants before the assessment.

**Conflict of Interest** All authors declare that they have no conflict of interest.

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