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EMPIRICAL RESEARCH

Longitudinal Links between Self-Critical Perfectionism and Adolescent Non-Suicidal Self-Injury: The Roles of Basic Psychological Need Frustration and Intentional Self-Regulation

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Abstract
Self-critical perfectionism represents a key vulnerability factor for adolescent non-suicidal self-injury (NSSI). Yet, given that most research relies on cross-sectional methods, little is known about the circumstances and processes through which this form of perfectionism is associated with NSSI. Drawing on self-determination theory, this one-year longitudinal study investigated a mediation pathway in which basic psychological need frustration linked self-critical perfectionism to NSSI and examined whether intentional self-regulation moderated this indirect pathway. Data collection occurred at three intervals (T1, T2, T3), each separated by six months. The final sample consisted of 1,258 Chinese adolescents (M_{age} at T1 = 13.78 years, SD = 1.41; 50.1% girls) who completed questionnaires assessing self-critical perfectionism, basic psychological needs frustration, intentional self-regulation, and NSSI. The results suggested that, after accounting for gender, age, and baseline levels of need frustration and NSSI, T2 need frustration served as a longitudinal mediator between T1 self-critical perfectionism and T3 NSSI. Furthermore, the link between T2 need frustration and T3 NSSI, representing the second stage of the mediation model, was moderated by T2 intentional self-regulation, such that greater intentional self-regulation among adolescents attenuated this association. These findings underscore adolescence as a key developmental stage where perfectionism, need frustration, and self-regulation interact to shape NSSI risk.

Keywords Self-critical perfectionism · Non-suicidal self-injury · Basic psychological need frustration · Intentional self-regulation

Introduction

Non-suicidal self-injury (NSSI) refers to deliberately harming one's own body tissue in a direct manner, without the intention of suicide (Nock, 2010). This behavior typically emerge and peak during adolescence (Zheng et al., 2025). A meta-analysis encompassing data from 41 countries found that approximately 22.9% of adolescents had engaged in NSSI at least once during their lifetime, with 18.6% reporting such behavior over the past year (Gillies et al., 2018). In China, a similar meta-analysis reported a lifetime prevalence rate of 22.4% (Lang & Yao, 2018). During adolescence, academic and social pressures intensify, and self-evaluative tendencies such as self-critical perfectionism become more pronounced (Damian et al., 2022). This makes adolescence a critical period for examining perfectionism as a risk factor for NSSI (Gu et al., 2022). Although prior studies suggest that self-critical perfectionism may be related to adolescent NSSI, most have relied on cross-sectional designs (Gyori & Balazs, 2021), leaving the psychological mechanisms underlying this association unclear. To address these limitations, the present study employs a longitudinal design to clarify the temporal processes linking self-critical perfectionism to adolescent NSSI, with particular attention to identifying both the mechanisms through which self-critical perfectionism contributes to NSSI and the protective factors that may buffer these risks.

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Self-Determination Theory (SDT) and the Selection, Optimization, and Compensation (SOC) model together provide a coherent framework for the present study. SDT highlights basic psychological need frustration as a mechanism linking self-critical perfectionism to maladaptive outcomes such as NSSI, while the SOC model emphasizes intentional self-regulation as a protective process that can buffer these risks. Integrating these perspectives, our model proposes that self-critical perfectionism contributes to NSSI through need frustration, and that this pathway is attenuated by intentional self-regulation.

Self-Critical Perfectionism and NSSI

Self-critical perfectionism is characterized by the pursuit of unrealistically high standards, accompanied by intense self-criticism and cognitive distortions (Moroz & Dunkley, 2019). Such distortions include a perceived gap between one's achievements and expectations, uncertainty regarding one's abilities, and an excessive preoccupation with mistakes (Flett et al., 1996). The Benefits and Barriers Model of NSSI suggests that positive self-perception serves as both a protective mechanism and a barrier against NSSI (Hooley & Franklin, 2018). This perspective motivates individuals to engage in self-care and avoid self-injurious behaviors. Conversely, individuals with high levels of self-critical perfectionism often develop pessimistic self-perceptions that weaken these protective barriers, thereby increasing the likelihood of NSSI. Furthermore, highly self-critical individuals may engage in NSSI as a form of self-blame and self-retribution, using it to satisfy the urge for self-punishment (Hooley & Franklin, 2018).

A systematic review of 15 studies (14 cross-sectional and one longitudinal) involving predominantly adolescent and young adult samples across Western contexts found that NSSI and perfectionism were significantly positively correlated (Gyori & Balazs, 2021). Consistently, a study of U.S. college students ($n = 165$; $M_{age} = 19.82$ years; 75.3% female) found that individuals with a history of NSSI ($n = 56$) exhibited significantly higher levels of concern over mistakes than those who did not have a history of NSSI ($n = 109$; Hoff & Muehlenkamp, 2009). Concern over mistakes is widely recognized as a core indicator of self-critical perfectionism (Frost et al., 1990). Taken together, these findings suggest that self-critical perfectionism is an important risk factor for NSSI.

While much of the existing research has been conducted in Western contexts, self-critical perfectionism is also highly relevant among Chinese adolescents, who often face strong academic pressures and family expectations that foster harsh self-evaluation and fear of failure (Wang et al., 2025). Prior studies in Chinese adolescents and college students have shown that self-critical perfectionism predicts negative outcomes such as depression and suicidal ideation (Liu et al., 2024b; Wu, 2023). Given that NSSI is frequently used to cope with intense self-critical thoughts and emotions (Hooley & Franklin, 2018), examining its association with perfectionism in the Chinese context is essential for understanding both risk and resilience processes.

Basic Psychological Need Frustration as a Mediator

SDT posits that humans possess three fundamental needs—competence, relatedness, and autonomy—that are necessary for achieving optimal functioning and well-being (Ryan & Deci, 2000). The need for competence is satisfied when individuals feel effective in their activities; its frustration is marked by feelings of inadequacy and ineffectiveness. The need for relatedness is satisfied when individuals experience meaningful connections and a sense of belonging with others, whereas its frustration reflects a perceived absence of positive social bonds. The need for autonomy is fulfilled when individuals feel free to choose and act according to their own volition; conversely, its frustration arises from feeling pressured or controlled by external forces or internal compulsions (Núñez-Regueiro et al., 2025).

Self-critical perfectionism may contribute to greater frustration of psychological needs (Campbell et al., 2018). Evidence from a longitudinal study of 566 Belgian adolescents ($M_{age} = 13.28$ years; 70.8% girls) revealed that self-critical perfectionism led to increased need frustration six months later (Boone et al., 2014). By placing excessive pressure on themselves to achieve unrealistically high goals (Suh et al., 2023), adolescents with high self-critical perfectionism may experience frustration of their need for competence. In addition, self-critical perfectionism may indirectly erode the fulfillment of the relatedness need by influencing individuals' social interactions. For instance, a meta-analysis of 40 studies found that concern over mistakes ($r = 0.42$, 95% CI [0.36, 0.48]) and doubts about actions ($r = 0.45$, 95% CI [0.40, 0.51])—two central dimensions of self-critical perfectionism—were significantly associated with heightened social anxiety among college students (Ferber et al., 2024).

From an SDT perspective, NSSI can be understood as a maladaptive compensatory behavior used to relieve self-control strain when psychological needs are chronically thwarted (Vansteenkiste & Ryan, 2013). When such needs are obstructed, individuals are less likely to employ constructive coping strategies and more likely to resort to maladaptive ones—shifting from positive to pathological forms of compensation. Empirical evidence indicates a strong positive relationship between need frustration and adolescent NSSI (e.g., Geng et al., 2022; Gu et al., 2024). For instance, a group-difference study revealed that Canadian adolescents

who either initiated (n=44; 80% female) or maintained (n=30; 93% female) NSSI demonstrated significantly lower need satisfaction than those without such behavior (n=98; 80% female; Emery et al., 2017).

Although no empirical research has directly tested whether the link between self-critical perfectionism and adolescent NSSI is mediated by need frustration, several studies provide indirect support for this possibility. For example, self-critical perfectionism was found to indirectly increase the risk of binge eating through need frustration (Boone et al., 2014). Notably, NSSI and binge eating frequently co-occur (Eisenman et al., 2025) and share similar underlying functions (e.g., affect regulation, signaling distress) and risk factors (e.g., negative affectivity, self-critical perfectionism; Kiekens & Claes, 2020). Taken together, these findings indicate that frustration of basic psychological needs could serve as a "bridge" connecting self-critical perfectionism to NSSI in adolescents.

Intentional Self-Regulation as a Moderator

Experiencing need frustration does not necessarily lead all adolescents to engage in NSSI, suggesting that other factors may buffer or exacerbate this relationship (Gu et al., 2024). Among personal traits linked to adolescent problem behaviors, intentional self-regulation has been recognized as a key moderating factor (Liu & Chang, 2016). Intentional self-regulation is defined as the conscious process by which individuals coordinate situational demands, available resources, and personal goals to purposefully guide their thoughts, behaviors, and actions toward desired outcomes (Gestsdóttir & Lerner, 2007).

According to the SOC model, intentional self-regulation is an active, goal-directed process through which individuals coordinate situational demands, personal resources, and goals to achieve desired outcomes (Gestsdóttir & Lerner, 2007). In doing so, they purposefully guide their thoughts, behaviors, and actions—demonstrating a high level of self-control (Gestsdóttir & Lerner, 2007). Moreover, high self-control functions as a protective factor that mitigates the likelihood of NSSI (Zhu et al., 2021). When psychological needs are thwarted, individuals often experience negative developmental outcomes (e.g., anxiety; Wei et al., 2021). In such circumstances, adolescents with greater intentional self-regulation are more inclined to define clear goals and, through self-regulatory processes in goal pursuit, enhance their self-control (Zimmerman et al., 2007). This strengthened self-control helps them resist being overwhelmed by negative emotions like anxiety, thereby lowering their likelihood of engaging in NSSI (Zhu et al., 2021). Conversely, adolescents with poorly defined goals and limited self-regulation strategies are more likely to engage in NSSI as a coping mechanism to manage the negative consequences of thwarted needs. Thus, intentional self-regulation may play a moderating role, buffering the effect of need frustration on the likelihood of NSSI.

Current Study

Previous research has indicated an association between self-critical perfectionism and adolescent NSSI, yet the underlying mechanisms linking these constructs remain unclear. The current study addressed this gap by examining how, and under what conditions, self-critical perfectionism contributes to NSSI among adolescents. Using a three-wave longitudinal design, the study examined whether self-critical perfectionism would predict higher levels of NSSI over time (Hypothesis 1), whether basic psychological need frustration would account for this association as a mediator (Hypothesis 2), and whether intentional self-regulation would moderate the pathway from need frustration to NSSI such that higher levels of intentional self-regulation would weaken this link (Hypothesis 3; see Fig. 1). These aims reflect the study's focus on clarifying developmental vulnerabilities and protective processes that shape NSSI during adolescence.

Methods

Participants

Using a cluster sampling method, participants were drawn from middle schools situated in the provinces of Henan, Hubei, Zhejiang, and Jiangsu in China. The baseline assessment was conducted in October 2021, with 1,386 students participating. Follow-up assessments were carried out six months later (April 2022) and one year later (October 2022) with students from the same classes, identified based on participant information from the first wave. Across the two follow-up waves, 128 participants were lost due to reasons such as transferring to other schools or taking leave. The final sample comprised 1,258 adolescents aged 12 to 18 years (M=13.78, SD=1.41). Of these, 50.1% were girls (n=630), 78.7% (n=990) resided in rural areas, and 80.4% (n=1,011) were from non–only-child families.

Chi-square and independent-samples t-tests revealed that participants who withdrew did not differ significantly from those who remained in terms of demographic or study variables, suggesting the absence of systematic attrition.

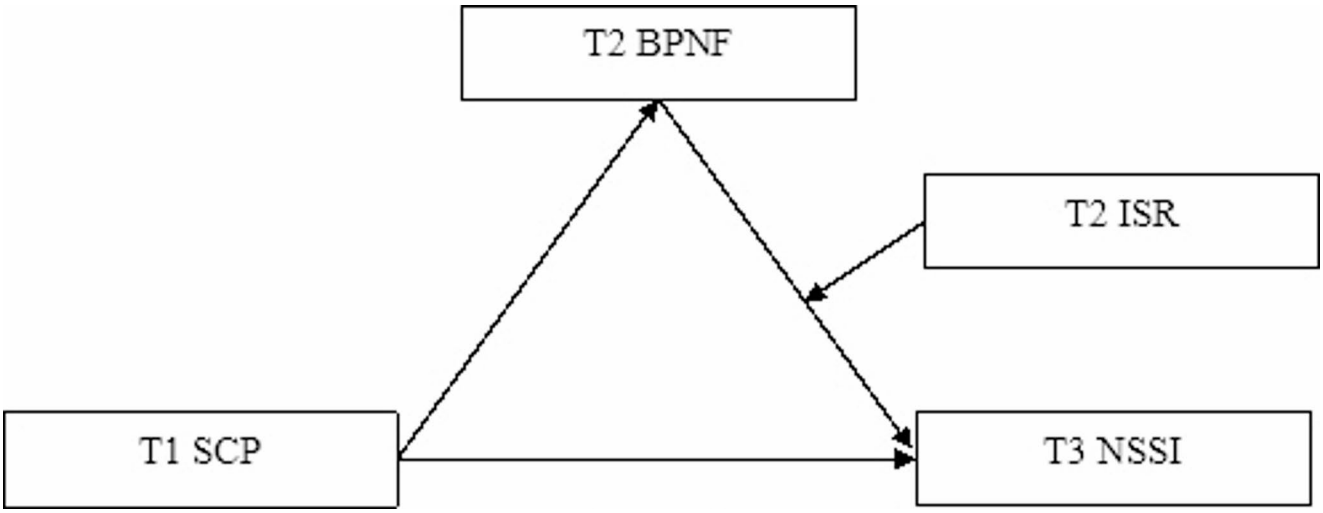

Fig. 1 Conceptual framework linking self-critical perfectionism to NSSI. *Note.* SCP = self-critical perfectionism; BPNF = basic psychological need frustration; ISR = intentional self-regulation

Procedure

This study was approved by the research ethics committee at the corresponding author's institution. Parents provided written informed consent, and children provided assent. Participants were informed that they could withdraw from the study at any time without penalty. They were also informed that their responses would remain confidential. Data were collected across three waves. At Time 1 (T1), participants completed measures of self-critical perfectionism, basic psychological need frustration, NSSI, and demographic information (e.g., age, gender); at Time 2 (T2), they completed measures of basic psychological need frustration and intentional self-regulation; and at Time 3 (T3), they completed measures of NSSI. All instruments were translated into Chinese using a standard translation and back-translation procedure to ensure semantic equivalence (Brislin, 1986). Each questionnaire was coded to allow matching across T1, T2, and T3; code assignments were stored securely, and identifying information was removed from the dataset once matching was complete. Participation at each wave took approximately 15 min, and procedures were consistent across survey waves. As a token of appreciation, participants received a small snack.

Measures

Non-suicidal self-injury (NSSI)

The Adolescent Self-Injury Behavior Scale (You et al., 2013) was employed to measure NSSI in this study. Participants reported the frequency of seven specific behaviors (e.g., cutting, biting, burning) over the past six months using a 6-point Likert scale, with 1 indicating "*never*" and 6 indicating "*five times or more*". Average scores across all items were computed, with higher scores reflecting greater frequency of NSSI. This measure has demonstrated good reliability and validity in Chinese adolescent samples (e.g., Zhu et al., 2021). The Cronbach's α coefficients were 0.82 at T1 and 0.89 at T3 in this study.

Self-critical Perfectionism

Self-critical perfectionism was assessed using the 9-item Concern over Mistakes (e.g., "I should be upset if I make a mistake") and the 4-item Doubts about Actions (e.g., "I usually have doubts about the simple everyday things I do") subscales of the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990). Participants responded using a 5-point Likert scale, with 1 indicating "*totally disagree*" and 5 indicating "*totally agree*". The average score was computed, with higher scores reflecting a higher level of self-critical perfectionism. This measure has proven reliable and valid in prior research with Chinese adolescent samples (e.g., Ying et al., 2021). Cronbach's α at T1 was 0.82 in this study.

Basic Psychological Need Frustration

The Basic Psychological Need Frustration subscale, consisting of 12 items from the Basic Psychological Need Satisfaction and Frustration Scale (Chen et al., 2015), was used to measure basic psychological need frustration. This subscale comprises three dimensions: autonomy frustration (e.g., "I feel pressured to do too many things"), relatedness frustration (e.g., "I have the impression that people I spend time with dislike me"), and competence frustration (e.g.,

"I feel insecure about my abilities"). Each item was rated using a 5-point Likert scale (1 = *completely untrue*, 5 = *completely true*), and the average score was computed, with higher scores reflecting a higher level of need frustration. This scale has demonstrated good psychometric properties in Chinese adolescent samples (e.g., Gu et al., 2023). The Cronbach's α coefficients were 0.80 at T1 and 0.85 at T2 in this study.

Intentional self-regulation

Intentional self-regulation was measured using the Intentional Self-Regulation Scale (ISAS; Gestsdóttir & Lerner, 2007), which includes nine items (e.g., "I make every effort to achieve a given goal"). Participants assessed their involvement in goal selection, optimization, and compensation over the past six months using a 5-point Likert scale, with 1 indicating "*strongly disagree*" and 5 indicating "*strongly agree*". Average scores across all items were computed, with higher scores reflecting better intentional self-regulation ability. The ISAS has proven reliable and valid in Chinese adolescent samples (e.g., Zuo et al., 2024). Cronbach's α at T2 was 0.82 in this study.

Data Analysis

First, SPSS 25.0 was employed to perform descriptive statistics and correlation analyses. Second, Mplus 8.0 was used to examine the mediating role of basic psychological need frustration in the link between self-critical perfectionism and NSSI, and the moderating role of intentional self-regulation on this mediation. T2 intentional self-regulation was used as the moderating variable rather than T3 intentional self-regulation because it was measured prior to the outcome (T3 NSSI), ensuring temporal precedence and allowing for a clearer test of its moderating role in the relationship between need frustration and NSSI. The results of Little's MCAR test revealed that the missing data were completely random, $\chi^2(168) = 115.90$, $p = 0.999$. Thus, missing values were handled using full information maximum likelihood (FIML) estimation.

The mediation effect was investigated through a non-parametric percentile bootstrap method, utilizing 5,000 resamples. Significance was determined based on the 95% confidence interval (CI) of the mediation effect; a mediation effect was regarded as significant if the CI excluded zero. Prior to model testing, all continuous variables were standardized. Finally, we used the Johnson-Neyman (J-N) method to probe the moderation effect (Hayes, 2013). Model fit for both the mediation and moderated mediation models was evaluated using χ^2, df, CFI, TLI, RMSEA, and SRMR. Model fit was deemed acceptable when CFI and TLI values were above 0.90, and RMSEA and SRMR values were below 0.08 (Marsh et al., 2004). Age, gender, baseline need frustration, and baseline NSSI were included as covariates in both the mediation and moderated mediation analyses.

Results

Descriptive Statistics and Correlation Analysis

To provide a clearer picture of sample characteristics, we examined the distribution of NSSI engagement across the three waves. Based on the three-level classification derived from the 6-point Likert scale (1 = never, 2–4 = occasional [1–3 times], 5–6 = repeated/frequent [≥4 times]), the majority of participants reported no lifetime history of NSSI, with 63.9% at T1, 72.2% at T2, and 78.3% at T3. Occasional NSSI was reported by 24.1% at T1, 18.9% at T2, and 14.0% at T3, while repeated/frequent NSSI was reported by 12.0% at T1, 8.9% at T2, and 7.7% at T3.

In addition, we examined the distribution of seven specific NSSI behaviors at each wave (see Table 1). Cutting was the most common method, with prevalence rates of 20.9% at T1, 16.3% at T2, and 13.7% at T3, whereas burning was

Table 1 The distribution of seven specific NSSI behaviors at each time point

Type of behavior	Time 1			Time 2			Time 3		
	Never (%)	Occasional (%)	Frequent (%)	Never (%)	Occasional (%)	Frequent (%)	Never (%)	Occasional (%)	Frequent (%)
Cutting	79.1	15.3	5.6	83.7	12.5	3.8	86.3	9.2	4.5
Burning	95.8	3.7	0.5	96.8	2.6	0.6	95.6	3.7	0.7
Biting	80.9	14.4	4.7	84.1	12.4	3.6	86.7	10.3	3.0
Punching	88.7	8.5	2.8	91.0	6.8	2.2	91.4	6.6	2.0
Severe scratching	90.0	7.6	2.4	93.2	4.9	1.9	92.5	6.1	1.4
Inserting sharp objects	81.0	14.1	4.9	86.7	9.8	3.5	88.6	8.1	3.3
Banging	92.0	6.4	1.6	94.7	3.8	1.5	95.3	3.0	1.8

Note. Percentages are based on available data. Missing data per variable ranged from 0.1% to 1.2%. For simplicity, we recoded the original 6-point Likert scale of NSSI engagement frequency (1 = never, 2 = one time, 3 = two times, 4 = three times, 5 = four times, 6 = five times or more) into a three-level classification. Participants were categorized as: Never engaged in NSSI (0 times), Occasional NSSI (1–3 times), and Repeated/Frequent NSSI (≥4 times)

Table 2 Means, standard deviations and correlations of the study variables

	1	2	3	4	5	6	7	8
1. Gender	—							
2. T1 age	–0.08**	—						
3. T1 SCP	0.07*	0.07*	—					
4. T1 BPNF	0.09**	0.01	0.77***	—				
5. T2 BPNF	0.10**	0.02	0.60***	0.66***	—			
6. T2 ISR	–0.12***	0.08**	–0.11***	–0.14***	–0.09**	—		
7. T1 NSSI	0.08**	0.02	0.31***	0.37***	0.31***	–0.13***	—	
8. T3 NSSI	0.11**	–0.07**	0.18***	0.20***	0.29***	–0.10**	0.44***	—
M	0.50	13.81	2.65	2.70	2.71	3.40	1.31	1.22
SD	0.50	1.42	0.68	0.70	0.75	0.71	0.67	0.66

Note. $n = 1258$. Gender was coded as 0 = male and 1 = female. SCP = self-critical perfectionism; BPNF = basic psychological need frustration; ISR = intentional self-regulation

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

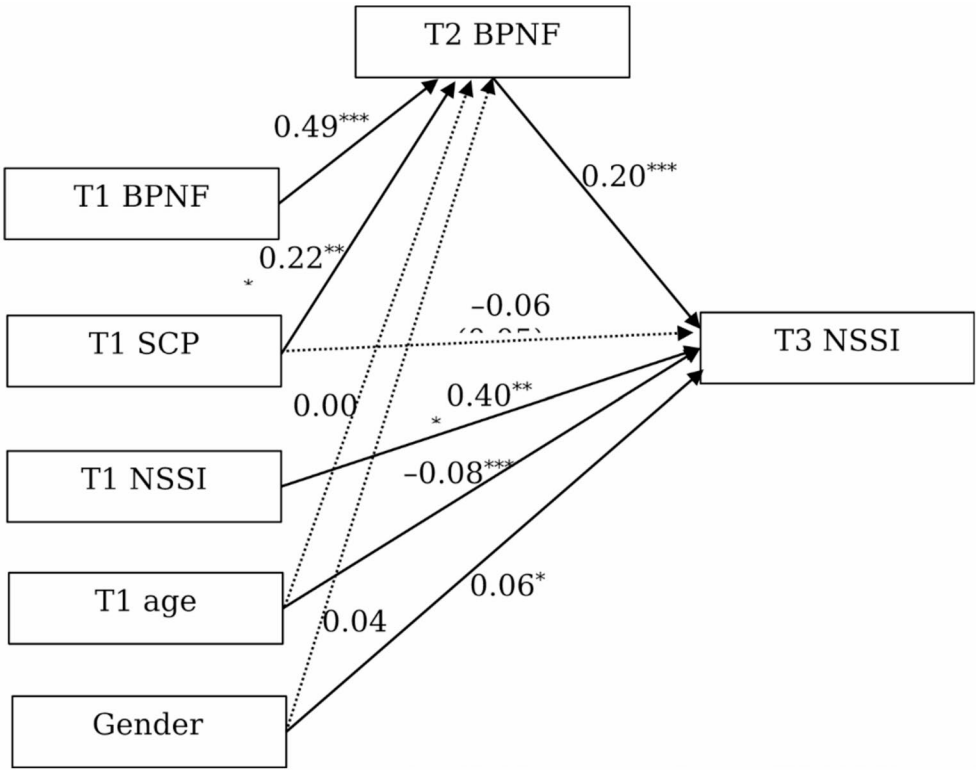

Fig. 2 The longitudinal mediating effect of basic psychological need frustration in the association between self-critical perfectionism and NSSI. *Note.* SCP = self-critical perfectionism; BPNF = basic psychological need frustration. The value in parentheses indicates the total effect of T1 self-critical perfectionism on T3 NSSI. Standardized coefficients are presented. Solid lines denote significant paths, whereas dashed lines denote non-significant paths. *$p < 0.05$, ***$p < 0.001$

the least common method, with prevalence rates of 4.2% at T1, 3.2% at T2, and 4.4% at T3. These findings indicate sufficient variation in both overall and specific NSSI behaviors, supporting the appropriateness of testing individual differences in relation to the current research questions.

Table 2 provides the means, standard deviations, and correlation coefficients for the study variables. T1 self-critical perfectionism, T1/T2 need frustration, and T1/T3 NSSI showed positive correlations with one another, while T2 intentional self-regulation exhibited negative correlations with the other variables.

Mediation Analysis

We used Mplus 8.0 to examine whether T1 self-critical perfectionism predicted T3 NSSI indirectly via T2 need frustration. The longitudinal mediation model fit the data well, $\chi^2(8) = 41.03$, CFI = 0.97, TLI = 0.96, RMSEA = 0.057, SRMR = 0.035. As depicted in Fig. 2, after controlling for gender, T1 age, and T1 need frustration, T1 self-critical perfectionism was positively related to T2 need frustration ($b = 0.22$, $p < 0.001$). After controlling for gender, T1 age, and T1 NSSI, T2 need frustration showed a positive association with T3 NSSI ($b = 0.20$, $p < 0.001$), whereas the residual direct effect of T1 self-critical perfectionism on T3 NSSI

was non-significant. ($b = -0.06$, $p = 0.100$). The nonparametric percentile bootstrap analysis revealed that the indirect effect of T1 self-critical perfectionism on T3 NSSI via T2 need frustration was 0.043, with a 95% confidence interval [0.024, 0.068], indicating a significant mediation effect. Overall, the model explained 21.6% of the variation in T3 NSSI.

Moderated Mediation Analysis

Building upon the mediation model, we further tested whether T2 intentional self-regulation moderated the indirect pathway linking T1 self-critical perfectionism to T3 NSSI through T2 need frustration. This moderated mediation model fit the data well, $\chi^2(4) = 18.65$, $p < 0.001$, CFI = 0.99, TLI = 0.95, RMSEA = 0.054, SRMR = 0.017. As shown in Fig. 3, T1 self-critical perfectionism significantly predicted T2 need frustration ($b = 0.21$, $p < 0.001$), and the interaction between T2 need frustration and T2 intentional self-regulation significantly predicted T3 NSSI ($b = -0.06$, $p = 0.047$). Overall, the moderated mediation model explained 23.2% of the variation in T3 NSSI.

The Johnson–Neyman (J–N) technique was used to probe the moderation effects of intentional self-regulation. As shown in Fig. 4, the positive association between T2 need frustration and T3 NSSI weakened as intentional self-regulation increased. This association was significant when intentional self-regulation scores were below 1.70, which represented approximately 95.2% of the participants. In contrast, for participants scoring above this threshold (about 4.8% of the sample), the effect of need frustration on NSSI was non-significant. Similarly, Fig. 5 illustrates that the indirect effect of T1 self-critical perfectionism on T3 NSSI via T2 need frustration was positive and significant when

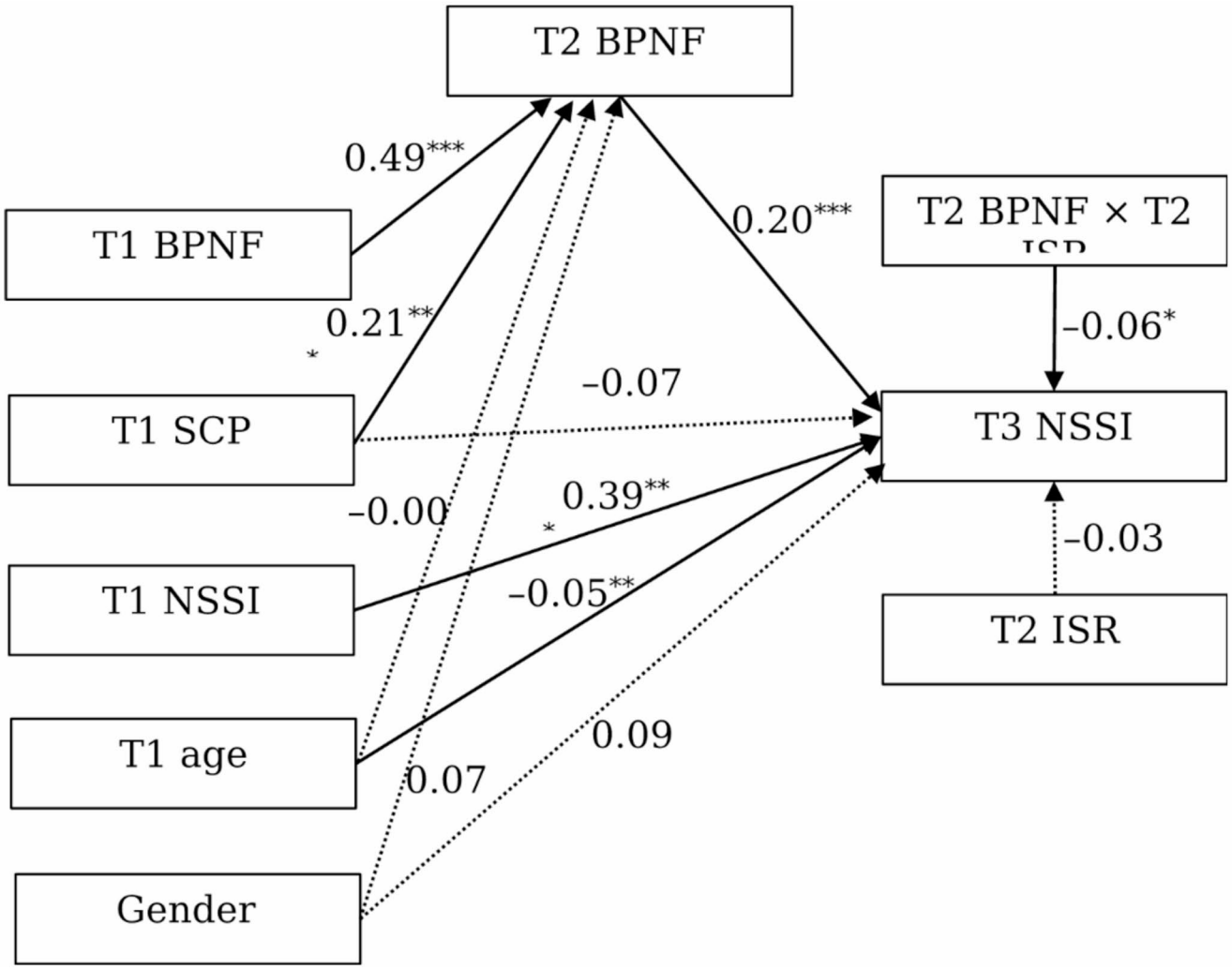

Fig. 3 The longitudinal moderated mediation model exploring the link between self-critical perfectionism and NSSI. *Note.* SCP = self-critical perfectionism; BPNF = basic psychological need frustration; ISR = intentional self-regulation. Unstandardized coefficients are presented. Solid lines denote significant paths, whereas dashed lines denote non-significant paths. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

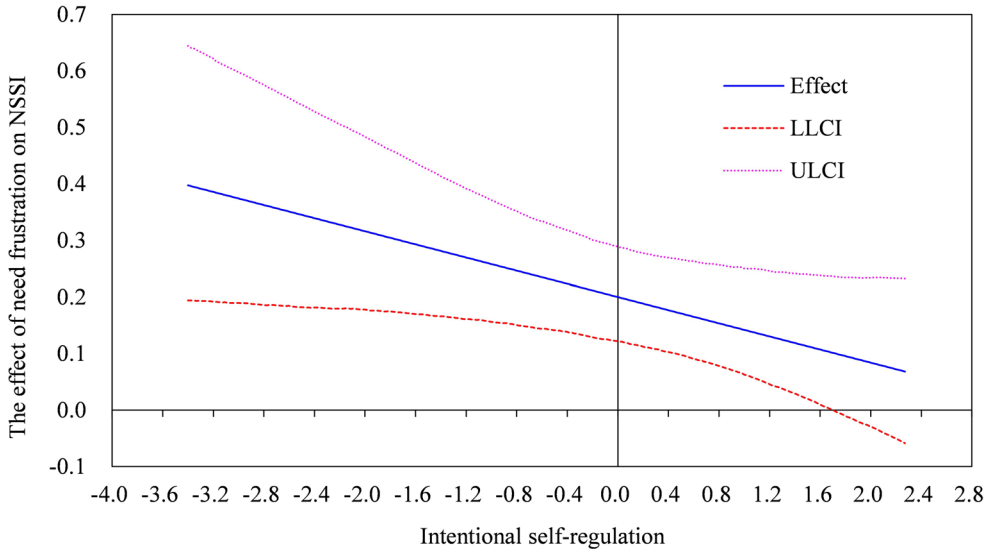

Fig. 4 The Johnson-Neyman plot illustrating the moderating effect of intentional self-regulation on the relationship between basic psychological need frustration and NSSI. *Note.* CI = 95% confidence interval; LL = lower limit; UL = upper limit. Basic psychological need frustration, intentional self-regulation, and NSSI were standardized scores

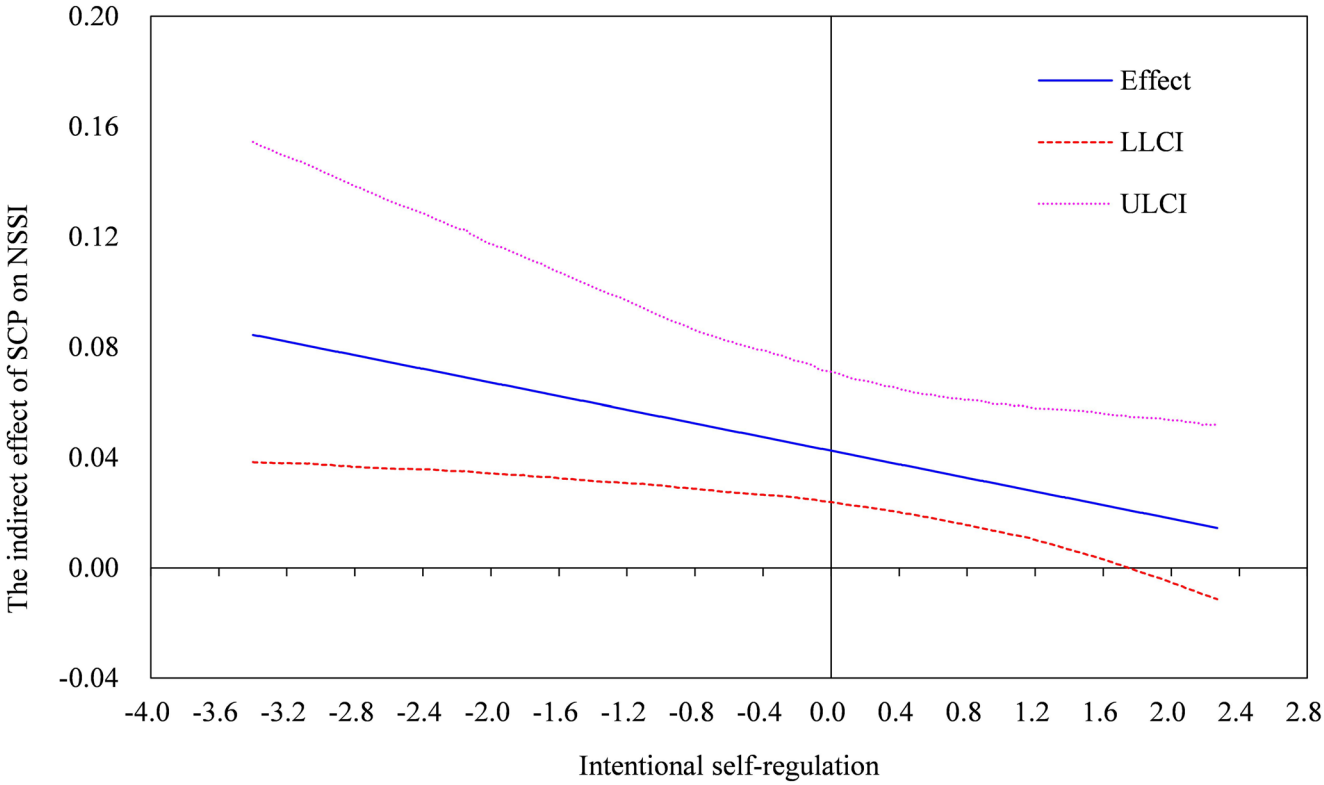

Fig. 5 The Johnson-Neyman plot illustrating the moderating effect of intentional self-regulation on the indirect association between self-critical perfectionism and NSSI. *Note.* SCP = self-critical perfectionism; CI = 95% confidence interval; LL = lower limit; UL = upper limit. Self-critical perfectionism, basic psychological need frustration, intentional self-regulation, and NSSI were standardized scores

intentional self-regulation was below 1.75 (about 95.3% of the participants), but remained positive and non-significant when intentional self-regulation was higher than this threshold (about 4.7% of the participants). These results suggest that intentional self-regulation operates as a meaningful protective factor for the vast majority of adolescents, buffering against the risk of translating need frustration into NSSI.

Discussion

Despite extensive research on adolescent NSSI, important gaps remain in understanding the psychological mechanisms that contribute to its onset and persistence, as well as the conditions under which these processes unfold. Prior work has highlighted the roles of perfectionistic tendencies

and unmet psychological needs (Emery et al., 2016; Ying et al., 2021), but the temporal pathways linking these vulnerabilities to NSSI, and the protective factors that may buffer them, are less clear. Addressing these issues is essential for clarifying developmental risks and resilience processes during adolescence, a period marked by heightened sensitivity to social pressures and still-maturing regulatory capacities (Blakemore & Mills, 2014; Xiao et al., 2025). This study conducted a three-wave longitudinal design to test whether self-critical perfectionism predicts NSSI through basic psychological need frustration and whether intentional self-regulation mitigates this risk, and the findings generally supported these expectations.

In this study, the prevalence of NSSI across the three time points ranged from 21.6% to 35.9%, which is consistent with previously reported prevalence rates of 13%-45% (Nock, 2010). These findings reaffirm that adolescents represent a high-risk group for engaging in NSSI behaviors. Analysis of specific NSSI methods indicated that cutting was the most prevalent form across all three time points, consistent with previous findings (e.g., Gillies et al., 2018). This high prevalence may reflect the easy accessibility of sharp objects, such as glass, which facilitate cutting. In contrast, burning accounted for the smallest proportion, likely because it is more difficult to execute and may result in irreversible damage to body image. Notably, adolescence represents a stage of rapid physical development and transformation for both boys and girls, which may heighten their sensitivity to body image concerns (Muehlenkamp & Brausch, 2012).

This study revealed that basic psychological need frustration acted as a mediator in the longitudinal relationship between self-critical perfectionism and NSSI. Specifically, adolescents with higher levels of self-critical perfectionism reported greater need frustration, which in turn predicted elevated risk for NSSI. Self-critical perfectionists tend to generate stress or immerse themselves in stressful situations through rigid self-evaluation and a heightened focus on negative aspects of events (Hewitt & Flett, 1993). According to SDT, when individuals encounter stressful social environments such as criticism or rejection, they are at risk of activating defensive mechanisms, which can undermine the satisfaction of basic psychological needs (Vansteenkiste & Ryan, 2013). When adolescents' psychological needs are chronically frustrated, they may resort to compensatory behaviors, such as NSSI, to reduce tension and obtain temporary relief from negative emotional states that arise in the context of prolonged need frustration (Gu et al., 2024). Together, these results underscore the importance of considering need frustration as a central mechanism linking self-critical perfectionism to maladaptive coping behaviors.

Another finding was that intentional self-regulation served as a moderator in the mediating pathway linking self-critical perfectionism to NSSI through need frustration. Specifically, intentional self-regulation weakened the latter half of this pathway, such that adolescents with stronger intentional self-regulation were less inclined to resort to NSSI in response to thwarted psychological needs. This result supports the view that intentional self-regulation fosters positive adolescent development (Urban et al., 2010) and lends empirical support to the risk-buffering hypothesis, which posits that protective factors can reduce the negative consequences associated with risk factors (Fergus & Zimmerman, 2005).

According to SDT, need frustration entails direct emotional consequences, including an increase in depression (Gu et al., 2023). Depression, as a negative emotional state, can deplete psychological resources and thereby impair self-control, leaving adolescents with lower self-regulatory capacity more vulnerable to engaging in deviant or maladaptive behaviors (Thoman et al., 2011). When experiencing heightened need frustration, adolescents with strong intentional self-regulation can mobilize goal-directed behaviors (e.g., through selective goal-setting and self-regulatory strategies) to strengthen self-control (Zimmerman et al., 2007), thereby buffering against maladaptive coping and decreasing the probability of NSSI engagement. In contrast, adolescents demonstrating diminished self-regulation abilities may struggle to manage impulses and regulate negative emotions, increasing their tendency to use NSSI as a strategy for managing distress or compensating for frustrated needs. These findings underscore the importance of fostering intentional self-regulation as a protective resource in adolescent development.

This study has several limitations that warrant acknowledgment. First, the retrospective self-report method used to assess NSSI may be susceptible to recall bias, as participants may have underreported or misremembered past behaviors. To improve measurement accuracy and ecological validity in future studies, ecological momentary assessment could be employed to capture NSSI behaviors in real time within participants' natural environments (Gee et al., 2020). Second, socioeconomic status (SES) was not measured in this study, which limits the ability to evaluate how differences in SES may intersect with perfectionism and NSSI (Liu et al., 2024a; Thakhur et al., 2024). This omission restricts the generalizability of the findings across diverse demographic backgrounds. Third, the sample was drawn from a specific cultural context, which may limit the applicability of the results to adolescents in other cultural settings. Finally, although the longitudinal design strengthens inferences about temporal order, definitive causal conclusions cannot be drawn from this study; experimental or intervention-based designs would be necessary to establish causality.

While not without limitations, this study provides practical insights for preventing and intervening in adolescent NSSI. The findings highlight the importance of addressing concerns over mistakes and doubts about actions that characterize self-critical perfectionism. Group-based cognitive-behavioral therapy (CBT) combined with positive psychotherapy has been shown to reduce depression, anxiety, and maladaptive perfectionism among Chinese university students (Zuo & Zhang, 2023), and adapting such approaches for adolescents may help reduce perfectionism-related vulnerabilities and, in turn, lower the risk of NSSI. In addition, the results underscore the protective role of intentional self-regulation, suggesting that interventions designed to strengthen regulatory capacities may be particularly effective in this cultural context. For example, the GPS (Goal Selection, Pursuit of Strategies, and Shifting Gears) project significantly enhanced intentional self-regulation skills among Chinese adolescents living in orphanages (Liu et al., 2020). Enhancing such capacities may help adolescents cope more effectively with challenges and reduce their vulnerability to NSSI.

Conclusion

Despite the important role of self-critical perfectionism in adolescent NSSI, it has remained unclear how and when this association develops. Integrating perspectives from SDT and the SOC model, our findings indicate that basic psychological need frustration mediates the longitudinal link between perfectionism and NSSI, highlighting need frustration as a central mechanism of vulnerability. At the same time, intentional self-regulation emerged as a protective factor that moderated this pathway, suggesting that adolescents with stronger self-regulatory capacities are less likely to translate need frustration into self-injurious behaviors. This study extends understanding beyond Western contexts by demonstrating the relevance of self-critical perfectionism among Chinese adolescents. Within a cultural context that strongly emphasizes academic achievement and family expectations, adolescents may be especially prone to internalizing self-critical tendencies, thereby increasing vulnerability to maladaptive outcomes such as NSSI. Taken together, these findings illuminate how risk and protective processes unfold in the Chinese cultural context, advancing developmental theory and offering actionable insights for the prevention of adolescent NSSI.

Author Contribution Y.C. conceived of the study, participated in its design and coordination, and drafted the manuscript; Y.H. participated in the design and interpretation of the data; H.G. conceived of the study, participated in its design and coordination, and helped to draft the manuscript. All authors read and approved the final manuscript.

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Declarations

Ethics Approval The study was approved by the research ethics review board of Hunan Normal University.

Conflicts of Interest The authors declare no competing interest.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Declaration of Generative AI and AI-assisted technologies in the writing process During the preparation of this work, the authors used ChatGPT (OpenAI) to assist with language editing and improving the clarity of English expression. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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