

From Rejection to Self-Harm: Longitudinal effects of real-world school-based interpersonal rejection on developmental trajectories of non-suicidal self-injury among early adolescents

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Abstract

Background

To examine the longitudinal impact of real-world interpersonal rejection in schools on the developmental trajectory of early non-suicidal self-injury (NSSI) behaviors among adolescents, and to identify potential subgroups of NSSI behavior and the predictive role of school-based interpersonal rejection on subgroup membership.

Methods

A three-wave longitudinal study was conducted with 1,379 seventh-grade students using the Adolescent Non-Suicidal Self-Injury Behavior Rating Questionnaire and the Adolescent School-Based Real-World Rejection Scale. Data were analyzed using descriptive correlational analysis, latent growth modeling, latent growth mixture modeling, and multinomial logistic regression.

Results

(1) Overall, NSSI among early adolescents exhibited a linear decreasing trend ($S = -0.38$, $P < 0.001$), with significant inter-individual variance in initial level (intercept variance $\sigma = 12.94$, $P < 0.001$). (2) Girls demonstrated significantly higher initial NSSI levels than boys. (3) Real-world school-based interpersonal rejection significantly predicted both the intercept and slope of NSSI trajectories. Being treated unfairly ($\beta = 0.24$, $P < 0.05$) and being ignored ($\beta = 0.16$, $P < 0.05$) significantly predicted the intercept; being rejected ($\beta = -0.16$, $P < 0.001$) and being ignored ($\beta = 0.22$, $P < 0.001$) significantly predicted the slope. (4) NSSI showed substantial heterogeneity and was classified into two developmental subgroups: the low-risk remission group (89.8%) and the high-risk worsening group (10.1%). (5) Being relationally victimized and being ignored significantly increased the odds of belonging to the high-risk worsening subgroup, whereas being rejected exerted a protective effect.

Conclusions

Real-world school-based interpersonal rejection constitutes a critical risk factor for elevated baseline levels and deteriorating developmental trajectories of NSSI in early adolescence. Special attention should be paid to early-adolescent experiences of being ignored and relationally victimized to strengthen risk warning and targeted interventions for NSSI.

Background

Schools constitute the primary setting for daily learning and peer interaction among adolescents, and the school interpersonal environment represents a critical external determinant shaping adolescent psychological and behavioral development [1]. Real-world school-based interpersonal rejection refers to social exclusion occurring within school contexts as a typical form of negative peer interpersonal experience, encompassing four dimensions: being rejected, being relationally victimized, being treated unfairly, and being ignored. It includes overt harms such as public rejection and verbal denigration, as well as covert adverse experiences including social isolation, dismissal, and marginalization[2]. Compared with overt school bullying, Real-world school-based interpersonal rejection is persistent, diffuse and covert. Adolescents chronically exposed to such exclusion are vulnerable to loneliness, low self-esteem, hopelessness and reduced school belonging. Cumulative unresolved negative emotions may be released via non-suicidal self-injury as a coping strategy[1]. Accordingly, Real-world school-based interpersonal rejection may serve as an important environmental risk factor triggering and sustaining adolescent non-suicidal self-injury.

Early adolescence (ages 10-14 years) is marked by rapid physical maturation, emerging self-awareness, intensified peer attachment, immature emotion-regulation capacities, and elevated risk for mental-behavioral problems[3]. Non-suicidal self-injury (NSSI) describes deliberate, direct destruction of bodily tissue without suicidal intent[4]. Characterized by high concealment, recurrence and chronicity, NSSI severely impairs adolescent mental-physical health and substantially increases risks of depression, anxiety, suicidal ideation and suicidal behaviors [5, 6]. Early adolescence represents a critical window for NSSI onset and progression. Investigating developmental patterns and risk factors for NSSI among early adolescents provides practical evidence for early identification, risk screening and precision-targeted intervention [7].

Existing studies on adolescent NSSI are largely dominated by variable-centered cross-sectional designs. Longitudinal research tracking dynamic developmental trajectories of NSSI and quantifying long-term predictive effects of real-world school-based interpersonal rejection on baseline NSSI levels and rates of change remain limited. Therefore, this three-wave longitudinal study recruited seventh-grade students from Xiangxi Autonomous Prefecture, Hunan Province. Latent growth models and latent growth mixture models were adopted to characterize overall longitudinal trajectories and inter-individual heterogeneity of NSSI, and to quantify predictive effects of total and dimension-specific real-world school-based interpersonal rejection on NSSI growth parameters. Findings may inform mechanism research, early risk warning and school-based intervention development for adolescent NSSI.

Based on theoretical links between real-world school-based interpersonal rejection and NSSI, four hypotheses were proposed:

H1: NSSI among early adolescents follows an overall linear decreasing trajectory.

H2: Total scores and four dimensions of real-world school-based interpersonal rejection positively predict the initial level (intercept) of NSSI.

H3: Real-world school-based interpersonal rejection positively predicts the rate-of-change parameter (slope) of NSSI trajectories.

H4: Heterogeneous NSSI developmental subgroups exist among early adolescents; dimensions of real-world school-based interpersonal rejection predict subgroup membership.

Subjects and Methods

Sample Size Calculation

The sample size was calculated using the formula: $n_{a2} = \mu \times [\pi \times (1 - \pi)]^2 / \delta$, $\mu = 1.96$ (corresponding to a 95% confidence interval). Based on previous studies reporting a non-suicidal self-injury rate of 27.4% [8], π was set at 0.274; α was set at 0.05, resulting in a margin of error δ of 0.05. Thus, the required sample size per group was $n = 306$. Since the study involved two groups (male and female), the total sample size became $n = 306 \times 2 = 612$. Accounting for an expected 20% invalid questionnaires and participant attrition, the adjusted sample size was $n = 612 / (1 - 0.2) = 765$. To ensure the integrity of longitudinal data, enhance model fit, and allow for potential dropouts and questionnaire exclusions, the actual sampling was expanded. A total of 1,379 valid questionnaires were collected and returned, meeting the data requirements for statistical analysis, latent growth models, and latent growth mixture models.

From September 2024 to March 2025, five public middle schools in Xiangxi Autonomous Prefecture, Hunan Province, were selected using a random cluster sampling method. Five seventh-grade classes were randomly selected from each school, resulting in a total of 25 classes and all students within these classes being included in the study. Three rounds of assessments were conducted: the first test (T1) was administered in September 2024, with 1,442 questionnaires distributed; the second test (T2) took place in December 2024, with 1,413 questionnaires distributed; and the third test (T3) was conducted in March 2025, with 1,408 questionnaires distributed. After eliminating lost or invalid responses, a final sample of 1,379 valid questionnaires was obtained, with participants averaging 12.72 ± 0.47 years old, including 715 males and 664 females. To ensure data quality, all investigators received standardized training prior to testing. Paper questionnaires were distributed and collected on-site by class, ensuring immediate return. This study obtained permission from the participating schools and informed consent from both participants and their parents. It has been approved by the Biomedical Ethics Committee of Jishou University (approval number: JSDX2023-0034).

Method

General Demographic Characteristics

A self-designed questionnaire was administered on-site to seventh-grade students, covering items such as gender, ethnicity, whether they were only children, and whether they lived in dormitories.

Non-Suicidal Self-Injury Behavior Questionnaire (NSSI)

Non-suicidal self-injury (NSSI) was assessed using the behavioral questionnaire of the Adolescent Non-Suicidal Self-Injury Behavior Assessment Questionnaire (ANSAQ) developed by Wan Yuhui et al. (Year) [4]. The questionnaire consists of 12 items assessing the occurrence of different forms of NSSI. Each item is rated on a 5-point Likert scale ranging from 0 ("never") to 4 ("always"). The item scores are summed to yield a total score ranging from 0 to 48, with higher scores indicating a higher level of NSSI. The questionnaire was originally developed and published by Wan Yuhui et al. (Year) [4] and was therefore not developed specifically for the present study. In the present study, the Cronbach's α coefficients were 0.85, 0.87, and 0.84 at the three measurement time points, respectively.

Real-world school-based interpersonal rejection Questionnaire This questionnaire adopted the Adolescent real-world school-based interpersonal rejection Scale [9] developed by Zhang Ye et al. (2019), consisting of 17 items divided into four dimensions: being rejected, being relationally victimized, being treated unfairly, and being ignored, with the neglect dimension scored in reverse. A five-point Likert scale was used, where each item had five response options—"never, occasionally, sometimes, often, always"—scored from 1 to 5 respectively. The total score ranged from 17 to 85, with higher scores indicating a greater level of perceived rejection. In this study, the Cronbach's α coefficient was 0.85.

Statistical Analysis

Data were organized and analyzed using SPSS 26.0 and Mplus 8.3 were used for data management and statistical modeling. Descriptive statistics and Pearson correlation analyses were performed to examine bivariate associations among study variables across T1-T3. An unconditional linear

latent growth model (LGM) was fitted to estimate average baseline levels and developmental change of NSSI. Conditional growth models were subsequently constructed by adding gender, total real-world school-based interpersonal rejection, and its four dimensions as time-invariant covariates to test their predictive effects on the intercept (initial NSSI level) and slope (rate of NSSI change). Latent growth mixture modeling (LGMM) was performed to identify heterogeneous developmental subgroups. Model fit criteria included AIC, BIC, aBIC, Entropy, Lo-Mendel-Rubin (LMR) test and bootstrapped likelihood-ratio test (BLRT). Multinomial logistic regression was conducted with trajectory subgroup membership as the outcome variable, dimensions of real-world school-based interpersonal rejection as predictors, and gender controlled. Model-fit benchmarks: CFI > 0.90, TLI > 0.90, RMSEA < 0.08, SRMR < 0.08. Statistical significance threshold was set at $\alpha = 0.05$.

Results

Descriptive Statistics The means

standard deviations, and correlation coefficient matrix of the variables at each testing stage are shown in Table 1. At each time point, self-injurious behavior was significantly positively correlated with school- based interpersonal rejection and its various dimensions.

Table 1
Means, standard deviations, and correlation matrix of the variables

Variable	M ± SD	1	2	3	4	5	6	7
1. T1 NSSI	3.58 ± 5.006	-						
2. T2 NSSI	2.99 ± 6.314	0.388**	-					
3. T3 NSSI	2.84 ± 7.160	0.266**	0.361**	-				
4. T1 real-world school-based interpersonal rejection	32.22 ± 11.085	0.343**	0.141**	0.162**	-			
5. T1 Being rejected	8.15 ± 4.090	0.301**	0.116**	0.123**	0.931**	-		
6. T1 Being relationally victimized	6.36 ± 3.382	0.320**	0.138**	0.153**	0.894**	0.791**	-	
7. T1 Being treated unfairly	8.92 ± 3.104	0.278**	0.108**	0.138**	0.798**	0.604**	0.636**	-
8. T1 Being ignored	9.78 ± 3.104	0.303**	0.133**	0.162**	0.860**	0.748**	0.661**	0.617**
Note: n = 1379,* P < 0.05; **P < 0.01. T1 = First test; T2 = Second test; T3 = Third test.								

Developmental Trajectories of NSSI in Early Adolescence

The unconditional linear model exhibited satisfactory fit: $\chi^2(1) = 2.34$, CFI = 0.99, TLI = 0.99, RMSEA = 0.03 (90%CI 0.00-0.09), SRMR = 0.01. The estimated intercept (baseline NSSI level) was 3.53 ($P < 0.01$). The average slope was -0.38 ($P < 0.01$), indicating an overall linear decline in NSSI across measurement occasions. Significant inter-individual variation existed for both intercept variance ($\sigma^2=12.94$, $P < 0.01$) and slope variance ($\sigma^2=4.46$, $P < 0.01$). Fit indices and parameter estimates are shown in Table 2. See Fig. 1.

Table 2
Parameter estimates and fit indices of the unconditional linear latent growth model

Model	$\chi^2(df)$	P	CFI	TLI	RMSEA	SRMR	Coefficient		Mutation	
							Intercept	slope	Intercept	slope
Unconditional linear model	2.34 (1)	> 0.05	0.99	0.99	0.03	0.01	3.53**	-0.38**	12.94**	4.46**
Note: * P<0.05; P < 0.01.										

Gender differences in NSSI trajectories

Gender (1 = boy, 2 = girl) was incorporated into the conditional LGM. Model fit: $\chi^2(2) = 1.08$, CFI = 0.98, TLI = 0.95, RMSEA = 0.03 (90%CI 0.00-0.07), SRMR = 0.014. Gender significantly predicted the intercept ($\beta = 0.13$, $P < 0.01$), suggesting girls had higher initial NSSI levels. Gender exerted no significant effect on the slope ($\beta = -0.02$, $P > 0.05$). Residual variances for intercept ($\sigma^2=15.97$, $P < 0.01$) and slope ($\sigma^2=4.68$, $P < 0.01$) remained statistically significant, justifying further exploration of additional predictors. See Fig. 2.

Effects of real-world school-based interpersonal rejection on NSSI developmental trajectories

The Impact of Realistic Interpersonal Rejection in School Settings and Its Dimensions on the Developmental Trajectories of Early Nonsuicidal Self-Injury Behavior in Adolescents To examine the influence of realistic interpersonal rejection in school settings on the developmental trends of early nonsuicidal self-injury (NSSI) behavior among adolescents, a conditional model was constructed by adding two time-invariant covariates—realistic interpersonal rejection in school and gender—to a linear unconditional latent growth model (see figure). Results indicated that the model fit well: $\chi^2(3) = 1.670$, CFI = 0.950, TFI = 0.949, RMSEA = 0.078 (90% CI = 0.053, 0.105), SRMR = 0.040. Findings revealed that both gender ($\beta = 0.146$, $P < 0.05$) and realistic interpersonal rejection in school ($\beta = 0.485$, $P < 0.05$) significantly predicted the initial level of the intercept, indicating that individuals who experienced such rejection had higher baseline levels of NSSI behavior. Moreover, realistic interpersonal rejection also significantly influenced the slope ($\beta = 0.224$, $P < 0.05$), suggesting that those experiencing greater levels of rejection showed faster increases in NSSI over time. In both the unconditional growth model and the conditional model including only gender, the correlation between intercept and slope was not significant; however, in models incorporating realistic interpersonal rejection and its dimensions, a significant association emerged between intercept and slope. This suggests that realistic interpersonal rejection acts as a shared risk factor, simultaneously affecting both the initial level and the rate of change in NSSI behavior, thereby revealing an underlying link between these two aspects. See Fig. 3.

Conditional LGM including gender and total real-world school-based interpersonal rejection showed acceptable fit: $\chi^2(3) = 1.67$, CFI = 0.95, TLI = 0.95, RMSEA = 0.08(90%CI 0.05-0.11), SRMR = 0.04. Both gender ($\beta = 0.15$, $P < 0.05$) and total real-world school-based interpersonal rejection ($\beta = 0.49$, $P < 0.05$) positively predicted the intercept. Total real-world school-based interpersonal rejection also significantly predicted the slope ($\beta = 0.22$, $P < 0.05$), meaning higher exclusion was associated with slower decline or even rising NSSI over time.

We further fitted a conditional model with four dimensions of real-world school-based interpersonal rejection and gender as covariates ($\chi^2(4) = 1.65$, CFI = 0.97, TLI = 0.95, RMSEA = 0.05(90%CI 0.03-0.07), SRMR = 0.05). After controlling for gender, being treated unfairly ($\beta = 0.24$, $P < 0.05$) and being ignored ($\beta = 0.16$, $P < 0.05$) positively predicted the intercept. For slope parameters: being rejected ($\beta = -0.16$, $P < 0.05$) exerted negative prediction, whereas being ignored ($\beta = 0.22$, $P < 0.001$) exerted positive prediction. The covariance between intercept and slope was statistically significant, indicating linkage between initial NSSI severity and subsequent change rates. Being ignored emerged as the most influential dimension for NSSI trajectories. See Fig. 4.

Identification of heterogeneous NSSI trajectory subgroups

LGMM was performed to extract latent trajectory classes. Fit statistics for 1-to 5-class solutions are summarized in Table 3. The two-class solution yielded optimal model performance.

Class 1 (low-risk remission group, 89.8%): Low initial NSSI level with decreasing trajectory (Intercept = 3.16, SE = 0.12, $P < 0.001$; Slope = -0.61, SE = 0.05, $P < 0.001$).

Class 2 (high-risk worsening group, 10.1%): High initial NSSI level with increasing trajectory (Intercept = 10.53, SE = 0.79, $P < 0.001$; Slope = 1.36, SE = 0.36, $P < 0.001$). See Fig. 5.

Table 3
Fit indices for latent growth mixture models of NSSI

Number of categories	Parameter entry	AIC	BIC	aBIC	Entropy	LMR	BLRT	Class probabilities
C = 1	8	25944.33	25986.16	25960.75	—	—	—	1.00
C = 2	11	24691.28	24748.80	24713.85	0.99	0.00	0.00	0.10/ 0.90
C = 3	38	24149.46	24222.67	24178.20	0.99	0.00	0.01	0.07/0.07/0.86
C = 4	51	24324.38	24444.65	24371.59	0.92	0.04	0.01	0.69/0.19/0.09/0.03
C = 5	64	24057.07	24203.49	24114.54	0.93	0.00	0.01	0.66/0.03/0.09/0.03/0.19

NSSI

Dimension-specific exclusion as predictors of trajectory-class membership

Multinomial logistic regression was implemented with the low-risk remission group as the reference category. Model 1 did not adjust for gender; Model 2 adjusted for gender covariates (Table 4). Being relationally victimized and being ignored significantly increased odds of belonging to the high-risk worsening subgroup, while being rejected showed a protective effect. Being treated unfairly displayed no significant predictive association with subgroup assignment.

Table 4
Associations between dimensions of real-world school-based interpersonal rejection and NSSI trajectory-class membership

Latent class		Model 1					Model 2				
		Beta value	Standard error	Wald χ^2 value	OR value (95% CI)	P-value	Beta value	Standard error	Wald χ^2 value	OR value (95% CI)	P-value
Category 1		1.000					1.000				
Category 2	Being rejected	-0.145	0.052	7.777	0.865(0.781–0.958)	0.005	-0.146	0.052	7.700	0.864(0.780–0.958)	0.006
	Being relationally victimized	0.140	0.066	4.572	1.151(1.012–1.309)	0.032	0.140	0.066	4.491	1.151(1.011–1.311)	0.034
	Being treated unfairly	-0.005	0.087	0.004	0.995(0.839–1.180)	0.951	-0.005	0.087	0.004	0.995(0.838–1.180)	0.952
	Being ignored	0.630	0.055	13.259	1.877(1.087–1.490)	0.001	0.630	0.055	13.218	1.877(1.686–2.090)	0.001

Discussion

This study systematically examined the longitudinal patterns of non-suicidal self-injury behaviors in early adolescence using latent variable growth models and latent mixture models, with a particular focus on testing the predictive power of perceived interpersonal rejection in school settings and its different dimensions on this developmental process.

The results of the unconditional latent variable growth model indicate that students in early adolescence initially exhibit relatively high baseline levels of self-harm behavior. However, as grade level increases and school adaptation improves, self-harm behaviors show an overall linear decline. This pattern aligns closely with findings from previous longitudinal studies. The underlying[10], reason is that seventh-grade students are at the early stage of puberty, facing multiple challenges such as significant physiological changes, academic advancement, and the reconfiguration of peer relationships. Their emotional regulation systems are not yet fully developed, making them particularly vulnerable to using self-harm as a way to release accumulated stress and anxiety[11]. As time spent in school extends, peer networks gradually stabilize, and the school environment becomes more familiar, leading to improved emotional management skills and social adaptability, which naturally reduces[12] impulsive self-harming responses. Additionally, the study confirms substantial individual heterogeneity in both initial levels and developmental rates of self-harm behavior, suggesting that generalizing trends based solely on group averages cannot adequately capture the full range of patterns among early adolescents. Some individuals may maintain high levels of self-harm or even experience worsening over time. This highlights the need for future research and school-based mental health interventions to move beyond one-size-fits-all approaches, emphasizing instead individual differences and tiered management strategies.

The study findings indicate that gender is a significant factor influencing the initial levels of non-suicidal self-injury (NSSI) among early adolescents, with girls showing significantly higher initial NSSI levels than boys. However, gender does not appear to have a notable effect on the longitudinal rate of change in NSSI behavior. This result aligns[13–15] with most existing research on adolescent self-injury. Girls tend to experience emotions more intensely and are more sensitive to peer evaluations and social isolation, often feeling stronger emotional distress when excluded, which may lead them to use self-injury as an emotional outlet. In contrast, boys are more likely to cope with stress[16] through physical activity or outward behaviors, and less inclined to engage in internalizing forms of self-harm. Therefore, school-based psychological interventions should prioritize emotional support and interpersonal adaptation guidance for girls, while also remaining vigilant about the hidden risks of NSSI among boys.

This study found that real-world interpersonal rejection in schools is a key risk factor for elevated initial levels and deteriorating developmental trajectories of NSSI behaviors among adolescents. Correlation analyses revealed significant positive associations between NSSI behaviors at three time points and total scores as well as individual dimensions of school-based interpersonal rejection. Conditional growth modeling further indicated that school-based interpersonal rejection positively predicted both the intercept and slope of NSSI behaviors—adolescents experiencing higher levels of such rejection had higher baseline NSSI levels, and their NSSI behaviors declined more slowly over time or even showed an upward trend. As a negative interpersonal context within schools, prolonged experiences of rejection, isolation, differential treatment, and verbal abuse continuously deplete adolescents' psychological resources, leading to low self-esteem, loneliness, feelings of hopelessness, and loss of school belonging[17]. When negative emotions cannot be effectively resolved, NSSI often emerges as an emotional coping mechanism. As a persistent negative social experience, ongoing rejection intensifies feelings of frustration and shame, increasing adolescents' sense[18] of despair and avoidance toward social interactions, thereby triggering NSSI[19]. Moreover, school-based interpersonal rejection further widens individual differences in early NSSI development, serving as a critical environmental variable explaining heterogeneity in adolescent NSSI behaviors.

From the perspective of various dimensions of interpersonal rejection in school settings, neglect is a core risk factor influencing the developmental trajectory of early self-harm behaviors among adolescents. After controlling for gender, differential treatment and neglect positively predict initial levels of self-harm behavior; neglect significantly and positively predicts the rate of change in self-harm over time—meaning that higher levels of neglect are associated with faster deterioration in self-harm behaviors—while rejection shows a negative predictive effect on the growth rate of self-harm. In terms of manifestations of interpersonal rejection in schools, different types of rejection may operate through distinct mechanisms affecting adolescent self-harm. Adolescents who experience prolonged neglect and marginalization are more likely [20, 21] to develop negative experiences such as loneliness, low self-esteem, and a lack of school belonging, and these emotional difficulties often remain unaddressed, accumulating over time and perpetuating self-harm behaviors. These findings suggest that interpersonal rejection in school settings is not a single, homogeneous risk factor; particularly, long-term, subtle forms of neglect may exert stronger chronic psychological harm than overt rejection. Therefore, schools should prioritize identifying and supporting at-risk students who have experienced prolonged peer neglect or marginalization when conducting mental health screenings and interventions.

This study used a latent growth mixture model to classify self-injurious behaviors among early adolescents into two latent subgroups: a "low-risk remission group" (89.8%) and a "high-risk worsening group" (10.1%), confirming the significant heterogeneity in the development of self-injury during early adolescence. The "low-risk remission group" exhibited relatively low initial levels of self-injury, which gradually diminished over time. During this period, adolescents face multiple overlapping stressors, including rapid physical development, social role adjustment, and increasing academic demands. These combined psychological, emotional, and environmental challenges can easily trigger non-suicidal self-injury. However, as they mature physically and emotionally, adolescents progressively adapt to the changes of puberty, school social environments, and academic rhythms. With improved emotional regulation and social adaptation skills, self-injurious behaviors naturally decline and overall tend to diminish. In contrast, the "high-risk worsening group" showed significantly higher initial levels of self-injury that continued to increase over time, representing a small but critical subgroup requiring close attention. This indicates that most cases of self-injury in early adolescence are temporary emotional outbursts related to pubertal development, which typically resolve naturally with age. Nevertheless, nearly 10% of adolescents experience a persistent rise in self-injury risk, making them key targets for mental health crisis screening in schools.

Furthermore, multinomial logistic regression results revealed that being verbally abused or neglected significantly increased the likelihood of being classified into the high-risk worsening group, while experiences of rejection demonstrated a protective effect. Notably, the present study revealed a counterintuitive finding: whereas being ignored and being relationally victimized consistently predicted elevated NSSI risk and adverse trajectory development, being rejected exerted a significant negative predictive effect on the slope parameter, suggesting that overt peer rejection was associated with a faster decline—or slower escalation—of NSSI over time. One plausible explanation lies in the distinction between overt and covert forms of interpersonal adversity. Overt rejection—such as explicit verbal refusal, public confrontation, or direct exclusion from group activities—is typically salient, identifiable, and time-bound. When adolescents encounter explicit rejection, the source of distress is clear and attributable to specific peers or events, which may facilitate targeted coping, social support seeking, or deliberate disengagement from hostile peer groups. In contrast, being ignored and relational victimization are ambiguous, chronic, and low-visibility: the adolescent may struggle to identify a clear perpetrator or articulate the harm, leaving feelings of social invisibility, loneliness, and self-blame unresolved and cumulatively corrosive. From an emotion-regulation perspective, identifiable stressors are more amenable to cognitive reappraisal and problem-focused coping, whereas ambiguous, persistent social neglect tends to foster rumination, internalized shame, and maladaptive affect regulation—including NSSI.

This interpretation is consistent with prior literature distinguishing "hot" overt peer victimization from "cold" social exclusion. Overt victimization, although acutely distressing, often triggers externalizing responses (e.g., anger, confrontation, help-seeking) that may redirect negative affect outward rather than inward. Relational victimization and social neglect, by contrast, are more strongly linked to internalizing symptoms, loneliness, and diminished belonging—well-established precursors of NSSI. The protective association observed for being rejected may also reflect a selection or adaptation effect: adolescents who experience overt rejection early may receive timely attention from teachers, parents, or mental-health staff, triggering intervention before NSSI patterns become entrenched. Conversely, chronically ignored adolescents often remain invisible to school support systems, allowing NSSI to develop undetected.

These findings carry important practical implications. School-based screening and intervention programs should not focus exclusively on overt bullying or visible peer conflict. Chronic social neglect and relational victimization—precisely the forms of exclusion least likely to be reported or detected—appear to be the most potent drivers of persistent and worsening NSSI. Educators and school psychologists should be trained to recognize subtle indicators of social isolation (e.g., persistent solitude at meals, lack of peer interaction, withdrawal from group activities) and prioritize these students for proactive social support and psychological monitoring. Additionally, intervention programs should target the specific psychological mechanisms linked to covert exclusion—loneliness, low belonging, and self-blame—rather than adopting a one-size-fits-all anti-bullying framework.

Limitations

Several limitations should be acknowledged. First, participants were recruited only among seventh-grade students within Xiangxi Prefecture, limiting generalizability to broader age groups and geographic regions. Second, all data relied exclusively on adolescent self-reports, which may introduce response bias. Third, only baseline-wave real-world school-based interpersonal rejection was included as a time-invariant predictor; family-context,

emotional-cognitive, and social-support variables were not incorporated to test mediating or moderating mechanisms. In addition, the follow-up duration was relatively short, and no intervention component was embedded. Future research should expand multi-site, multi-grade samples, adopt multi-informant assessment (student, teacher, caregiver), explore bidirectional associations between interpersonal exclusion and NSSI, test underlying mediating-moderating pathways, and develop and evaluate stratified intervention programs tailored to distinct NSSI trajectory phenotypes. Qualitative interviews may complement quantitative findings to deepen understanding of subjective psychological experiences.

Conclusions

Real-world school-based interpersonal rejection, particularly experiences of being ignored and relationally victimized, represents a major risk factor for NSSI onset and progressive deterioration among early adolescents. Girls and youth exposed to covert real-world school-based interpersonal rejection deserve heightened concern. NSSI among early adolescents follows two distinct developmental courses: low-risk remission and high-risk worsening. Schools should foster inclusive peer climates, reduce Real-world school-based interpersonal rejection and peer victimization, implement continuous mental-health tracking screening, and deliver differentiated prevention and intervention strategies according to gender and peer-exposure profiles to reduce NSSI prevalence and safeguard adolescent mental-physical health.

Abbreviations

NSSI non-suicidal self-injury

LGM latent growth model

LGMM latent growth mixture model

Declarations

Ethics approval and consent to participate

The study was approved by the Biomedicine Ethics Committee of Jishou University (approval number: JSDX2023-0034) and was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants and their legal guardians prior to data collection.

Consent for publication

Not applicable. This manuscript does not contain any individual person’s data in any form (including individual details, images, or videos).

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

A.W. and J.H.Z. conceptualized the study; T.C.Z. designed the methodology; A.W. performed formal analysis; T.C.Z. acquired funding; all authors reviewed and edited the manuscript.

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We thank all participating schools, teachers and students for their contribution to this longitudinal investigation.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy and ethical considerations concerning the protection of adolescent participants

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Figures

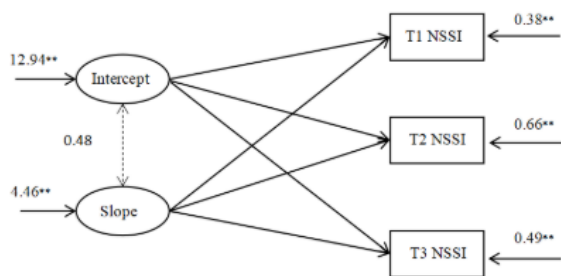


Figure 1

Linear unconditional latent variable growth model for NSSI

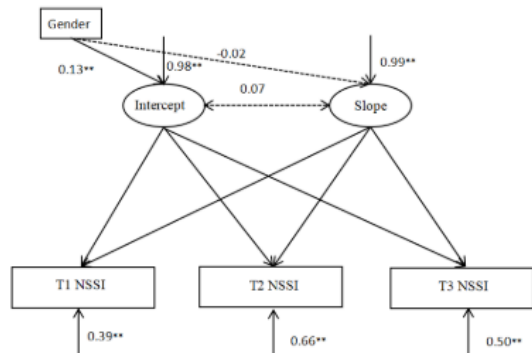


Figure 2

The influence of gender on the trajectory of NSSI changes

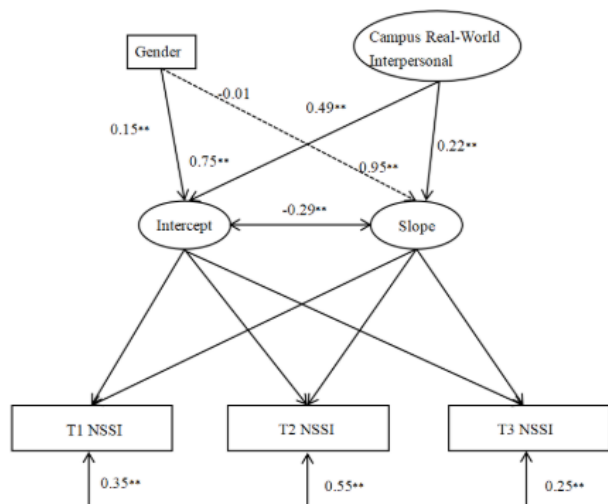


Figure 3

The influence of gender and real-world school-based interpersonal rejection on the trajectory of NSSI

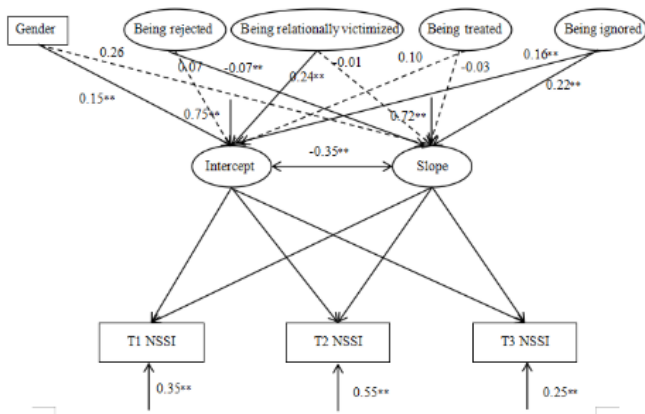


Figure 4

The influence of gender and dimensions of real-life interpersonal rejection in the campus environment on the trajectory of NSSI

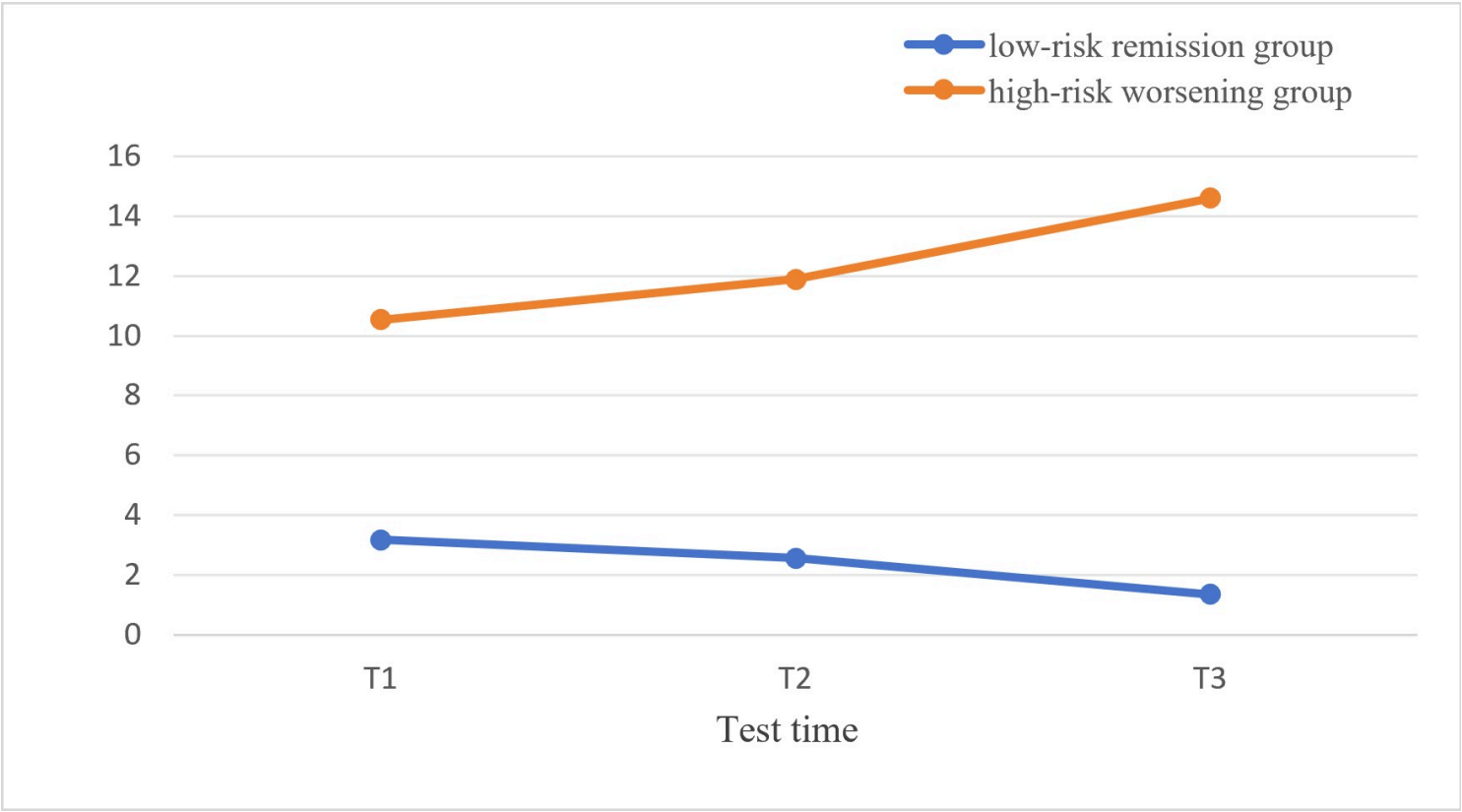


Figure 5

Estimated means and growth trajectories for each latent class