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Nonsuicidal Self-injury as a Gateway to Suicide in Young Adults

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A B S T R A C T

Purpose: To investigate the extent to which nonsuicidal self-injury (NSSI) contributes to later suicide thoughts and behaviors (STB) independent of shared risk factors.
Methods: One thousand four hundred and sixty-six students at five U.S. colleges participated in a longitudinal study of the relationship between NSSI and suicide. NSSI, suicide history, and common risk/protective factors were assessed annually for three years. Analyses tested the hypotheses that the practice of NSSI prior to STB and suicide behavior (excluding ideation) reduced inhibition to later STB independent of shared risk factors. Analyses also examined factors that predicted subsequent STB among individuals with NSSI history.
Results: History of NSSI did significantly predict concurrent or later STB (AOR 2.8, 95%, CI 1.9—4.1) independent of covariates common to both. Among those with prior or concurrent NSSI, risk of STB is predicted by > 20 lifetime NSSI incidents (AOR 3.8, 95% CI, 1.4—10.3) and history of mental health treatment (AOR 2.2, 95% CI, 1.9—4.6). Risk of moving from NSSI to STB is decreased by presence of meaning in life (AOR .6, 95% CI, .5—.7) and reporting parents as confidants (AOR, .3, 95% CI, .1—.9).
Conclusions: NSSI prior to suicide behavior serves as a "gateway" behavior for suicide and may reduce inhibition through habituation to self-injury. Treatments focusing on enhancing perceived meaning in life and building positive relationships with others, particularly parents, may be particularly effective in reducing suicide risk among youth with a history of NSSI.

IMPLICATIONS AND CONTRIBUTION

This longitudinal study of the relationship between NSSI and suicide finds NSSI precedes or co-occurs with suicide in 61.6% of cases; NSSI heightens risk for later suicide independent of shared risk factors; and there are factors which predict risk of moving from NSSI to suicide in this population.

Nonsuicidal self-injury (NSSI) is defined as the "deliberate direct destruction or alteration of body tissue without a conscious suicidal intent." [1] NSSI and suicidal thoughts/behaviors (STB) in adolescents and young adult populations constitute areas of significant medical and psychiatric concern [2]. Of particular interest is the relationship between NSSI and STB since cross-sectional studies consistently show that NSSI and STB exist at high rates within inpatient and community samples of adolescents [3–6]. Within community populations, between 19% and 63% of individuals with NSSI history also report STB [3,4,7,8]. However, beyond documenting a strong association in cross-sectional studies, there remain significant questions related to the particularities of the relationship between NSSI and STB [9].

Given that the presence of NSSI may serve as an early or warning sign of STB, understanding the temporal relationship between them holds clear clinical relevance. In addition to

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understanding how often NSSI occurs before, concurrent with, or after STB, one of the primary questions of interest is the extent to which NSSI contributes to later development of STB independent of shared risk factors. Wichstrom [10] found NSSI did not predict later suicide attempt, though several risk and protective factors were found to be linked to both, suggesting that perhaps NSSI and STB are related but distinct phenomena. However, Wilkinson and colleagues [11] found that that 36% of all adolescent participants reported at least one act of NSSI in the month before baseline and that this was an optimal predictor of STB. Such findings raise questions about the relationship between NSSI and STB and suggest that, in some instances, the practice of NSSI may reduce inhibition to suicide action, as some have suggested [12].

What differentiates individuals with NSSI history who do and do not show concurrent or later suicidality is another question with important clinical implications. The strong relationship between NSSI and emotion dysregulation [13,14], low social support [3,10,11,15], and global psychological distress [15–17] suggest that these and related variables, such as cognitive style [18], sense of meaning in life [3,4], mental health history [16,19], and trauma history [15,20,21], may mediate the relationship between NSSI history and future STB. Furthermore, research suggesting that discussing and reflecting on emotional problems with peers may exacerbate mental distress for younger people [22,23] suggests that who one chooses to confide in about mental distress matters. Understanding what indicators predict concurrent or later STB among individuals with NSSI history may help clinicians identify individuals who are and are not at elevated risk for more lethal self-injury behaviors.

The current study documents the relationship of NSSI to suicide risk in a prospective design using a community sample of young adults. NSSI is hypothesized to be a risk factor for concurrent or later suicidal thoughts (ST) as well as suicide behaviors (i.e., excluding those with ideation only; SB) independent of demographic and psychosocial factors common to both. We also hypothesize that there will be a positive linear relationship between NSSI lifetime frequency and suicide variables. We hypothesize that individuals who do show later suicide behavior will score higher on indicators of trauma and distress and lower on indicators of emotional regulation, social support, meaning in life, and optimism than those who do not progress from NSSI to STB.

Methods

Sample

In 2007, 14,372 students from eight Northeast and Midwest public and private universities participated in a Web-based study entitled the *Survey of Student Wellbeing (SSWB)*. The sample was representative of the overall student population across all eight universities in terms of ethnicity, age, and socioeconomic status although more females than males participated (57.6% vs. 41.7%, 95% CI, 53.3–59.2; $Z = 14.96$, $p < .001$). Five of these universities agreed to allow participants the option of participating in a longitudinal study. Two of the five schools were private, two were public, and one was a mix of public and private. All but one are located in largely urban areas.

Of 5,214 eligible respondents, 2,320 (44.5%) indicated willingness to participate in longitudinal study. A total of 1,810 (78%) of these participated at Time 2 (spring 2008). Of the eligible 1,810, a total of 1,466 participated at Time 3 (spring 2009). This represents 63.2% of the original sample (n = 2,320) willing to participate in longitudinal study. The final sample did not differ from the original cross-sectional sample of students from the original eight-college study by sex, ethnicity/race, age, sexual orientation, or socioeconomic status, NSSI history, or STB history. At baseline the longitudinal sample (n = 1,466) had an average age of 20.3 (SD = 4); was 59.9% female; 75.5% heterosexual, 16.1% mostly heterosexual, 4.5% bisexual, 3.9% gay/lesbian; 69.3% Caucasian, 4.8% African-American, 3.8% Hispanic, 11.1% Asian, and 11% other; 72.2% had fathers who had completed college.

Study design and questionnaire

A *Survey of Student Wellbeing (SSWB)* was administered annually via a secure Internet server and required 15–30 minutes to complete. The *SSWB* was confidential and accessed privately by participants. The study was approved by all participating universities' Committee for Human Subjects. Links to local mental health resources were at the bottom of every page.

NSSI and suicide-related thoughts/behaviors. NSSI was assessed using the Non-Suicidal Self-Injury Assessment Tool (NSSI-AT), developed for a two-college study [17] and validated in repeat studies [24–26]. An initial screening question for NSSI, "Have you ever done any of the following *with the purpose of intentionally hurting yourself*?" is followed by a list of 19 NSSI behaviors (e.g., "cuts wrists, arms, legs, torso or other areas of the body" and "carves words or symbols into the skin"). Participants were then asked questions that assessed NSSI characteristics including but not limited to frequency, age of onset and cessation, and function. Lifetime frequency of NSSI (coded as 0, 1, 2–5, 6–20, > 20) was used in these analyses. Individuals who reported using self-injury exclusively as a means of practicing or attempting suicide were classified as not having practiced NSSI; this was determined by response to a follow-up question asking about intent of self-injury.

Reports of suicidal ideation, behaviors, and attempts were measured with a validated scale [27], adapted to a Web-based format by including an initial screening question, "Have you ever seriously considered or attempted suicide?" Individuals who answered positively were asked to identify specific behaviors engaged in (including ideation) and additional details. Retrospective information about age of onset for both NSSI and suicide-related thoughts/behaviors provided at baseline were used in addition to the longitudinal data to assess the temporal relationship between NSSI and STB.

Covariates. Covariates included demographic, psychosocial, history of mental illness, and formal and informal help-seeking variables. Demographic characteristics included gender, age, race/ethnicity, father's education level (used as a proxy for socioeconomic status), and sexual orientation. Psychosocial variables included three validated multi-item scales: life orientation (e.g., pessimism vs. optimism) [28], acceptance of emotion [29], sense of meaning in life [30], and perceived peer social isolation [31]. All of these were scored using a Likert-type response scale and showed acceptable Cronbach's alphas in the sample across each wave (.73–.92). Informal help-seeking was assessed by asking "Who do you feel comfortable getting help from when you feel anxious, sad, or depressed?" Respondents selected all that applied from a list of 23 categories that ranged from friends and parents to therapists and local providers. Both the cumulative number of categories identified and categorical

variables reflecting confidant type (e.g., peers, informal non-parental adults, formal adults, and parents) were used in analyses.

A count of the number of lifetime traumas (e.g., witnessing or experiencing violence, death of a loved one) was assessed with a modified version of the Life History Calendar [32]. Psychological distress was measured with the K-6, which captures DSM-IV classifiable anxiety and/or depression within last 30 days [33]. Personal and parental mental health history were assessed by question lists asking the respondent to identify which of 12 major psychiatric disorders (e.g., borderline personality disorder, depression, obsessive compulsive disorder) he/she had (1) been diagnosed with; (2) believed she/he suffered from; and (3) knew that father and mother (assessed separately) had been diagnosed with. Father mental heath status was not used in the analyses since no preliminary analysis suggested a significant relationship to primary outcomes. Each of these three was collapsed into a single binary variable reflective of presence or absence of mental health history. History of mental health treatment was assessed by asking: "Have you ever gone to a therapist (e.g., psychologist, psychiatrist, social worker) to talk about an issue you were having (not including family or couples' therapy)?"

Statistical analyses

All analyses were conducted using SPSS version 19 [34]. A bivariate test of proportions using Chi-squared tests compared the proportion of suicidal respondents who practiced NSSI before they ever expressed STB (NSSI first) to the proportion of self-injuring respondents who had expressed STB before NSSI (STB first). Analyses were run separately for STB and the smaller subset of more serious SB (i.e., excluding individuals reporting no suicidal action outside of ideation).

Assessment of whether NSSI contributed independently to the development of STB was conducted using discrete time analysis models [35] with all respondents in the longitudinal data (n = 1,466). With these models, a respondent's data are included up to the wave at which the event (STB or SB in this case) occurs; data collected after the event occurrence are not included in the analysis. If the event never occurs for a study participant, all waves of data are included and the event is treated as censored.

Discrete time analysis models are particularly useful in the present context because the occurrence of STB was measured as a discrete, categorical variable, rather than a continuous measure occurring on a specific date. As described by Allison [35], these models are attractive because they do not have to exclude the data from participants who do not report STB, they can incorporate time varying covariates, and they can be estimated as a logistic regression model, which is a common and well-understood analytic technique.

The final analysis—identification of characteristics that predicted which individuals with NSSI history would progress to STB—was restricted to the 253 participants who displayed any NSSI *prior to* or *concurrent with* any STB. Those participants who displayed STB before NSSI (n = 36) were excluded from the analysis, since NSSI was clearly not an antecedent to or concurrent with STB. The analysis was conducted by using binary

Table 1
Frequency or mean of time varying dependent and independent variables[a]

Variable	No (%) or Mean (SD)			
	Lifetime prevalence or score 4eported at time 1 (T1)	New cases or score since T1 reported at time 2 (T2)	New cases or score since T2 reported at time 3 (T3)	Cumulative to Time 3 or mean across all time points
Outcome variables[b]				
Any NSSI	201 (13.7)	77 (5.2)	11 (.8)	289 (19.7)
Frequency and percent among those with NSSI:				
Once	23 (11.4)	15 (19.5)	0	18 (6.3)[c]
2–5 times	72 (35.8)	36 (46.7)	6 (54.5)	118 (40.8)[c]
6–20 times	31 (15.4)	12 (16)	3 (27.3)	62 (21.3)[c]
>20 times	75 (37.3)	14 (18.1)	2 (18.1)	91 (31.6)[c]
Any suicide-related thoughts/behavior (STB)	142 (9.7)	32 (2.2)	18 (1.2)	192 (13.1)
Suicide behavior only (SB)	98 (6.7)	22 (1.5)	6 (.4)	126 (8.6)
Psychosocial variables[d]				
Acceptance of emotion scale	4.05 (.88)	4 (.96)	4.03 (.86)	4.03 (.9)
Optimistic cognitive style scale	N/A	1.98 (.58)	1.99 (.61)	1.99 (.56)
Social connectedness scale	3.35 (.43)	3.46 (.48)	3.50 (.44)	3.43 (.45)
Sense of meaning in life scale	4.72 (1.02)	4.78 (1.01)	4.73 (1.07)	4.74 (1.03)
Number of informal confidant categories	4.38 (2.7)	4.35 (2.4)	4.30 (2.5)	4.34 (2.5)
Mental health and treatment variables				
Presence of current psychological distress (K-6)[b]				
Low (6–13)	991 (67.6)	1,154 (78.7)	1,187 (81)	488 (33.3)[e]
Moderate (14–18)	388 (26.5)	255 (17.4)	226 (15.4)	781 (53.3)[e]
High (19–24)	87 (5.9)	57 (3.9)	53 (3.6)	196 (13.4)[e]
Perceives that he/she has struggled with DSM-IV classifiable condition[b]	424 (28.9)	94 (6.4)	88 (6)	606 (41.3)
Has been diagnosed with a DSM-IV classifiable condition[b]	218 (14.9)	91 (6.2)	26 (1.8)	336 (22.9)
Has received mental health treatment[b]	464 (31.7)	112 (7.6)	46 (3.1)	622 (42.4)

[a] This does not include lifetime history of trauma and maternal history of mental illness.
[b] Reported as N (%).
[c] Represents the number and percent of respondents for whom this category was the highest NSSI frequency category by time 3.
[d] Reported as mean and (SD) at each data collection point. Cumulative column reports average across all time points.
[e] Number and percent of respondents who report each category as the highest K-6 score reported across all 3 data collection periods.

logistic regression model with adjusted odds ratios (AORs) and 95% confidence intervals (CIs) with suicidality in the same or a later time point of data collection as the outcome. All predictor variables reflected Time 1 measures unless otherwise stated.

Results

Time variant data collected are reflected in Table 1. Variables collected only at Time 1 include binary measures of any lifetime history of trauma (38.9%, n = 570) and any maternal history of mental illness (25.4%, n = 373). At Time 1, one in five respondents (19.7%; n = 289) indicated having ever practiced NSSI, with 7.6% (n = 111) reported having practiced NSSI in the past year. New NSSI incidents between Time 1 and 2 were reported by 5.6% respondents (n = 82) with far fewer reporting new incidents between Time 2 and 3 (.8%; n = 11). Table 1 also reports 1 year prevalence of NSSI by frequency for years 2 and 3. Examination of number of NSSI incidents over time shows a distinct upward trend such that by the end of the study 93.7% (n = 271) of those with any NSSI reported repeat self-injury (>1 incidents).

At Time 1, 2.8% (n = 41) of all respondents reported having engaged in STB in the past year and 1.7% (n = 25) reported SB in the past year. Overall, by Time 3, 13.1% (n = 192) and 8.6% (n = 126) had reported any STB and SB respectively. Of those who exhibited STB, 63.1% (n = 121) reported NSSI in at least one time point. Of those who exhibited any NSSI, 38.5% (n = 111) reported any STB by the final wave of data collection.

The contribution of NSSI to later development of suicide-related thoughts/behavior

Analysis showed that NSSI was as likely to occur before any STB as it was to occur following STB. More specifically, of respondents reporting STB (n = 192), 20.3% (n = 39) reported NSSI prior to STB and 19.8% (n = 38) reported STB prior to NSSI. Another 11.4% (n = 22) reported engaging in NSSI and STB concurrently (i.e., within the reporting period) and 48.4% (n = 93) reported no NSSI history. Analysis of temporal sequencing of NSSI and SB (excluding individuals who only ideated) (n = 126) shows no significant difference; 7.9% (n = 10) report engaging in

Table 2
Contribution of non-suicidal self-injury to later suicide-related thoughts/behavior[a]

Characteristic	Odds ratio (95% CI)			
	Post NSSI development of any suicide-related thoughts/behavior		Post NSSI development of suicide behavior (excluding ideation)	
	Unadjusted model	Adjusted model	Unadjusted model	Adjusted model
NSSI lifetime frequency at Time 1[b]				
None	1.0	1.0	1.0	1.0
Once	1 (.2–4.2)	.8 (.2–3.6)	1.6 (.4–6.7)	1.4 (.3–6.1)
2–5	4.2[c] (2.6–6.8)	2.1[d] (1.2–3.8)	3.4[c] (1.9–6.3)	1.9 (.9–3.8)
6–20	8.9[c] (5.2–15.3)	5[c] (2.6–9.6)	7.6[c] (4–14.5)	4.5[c] (2.2–9.3)
>20	8.9[c] (5.4–14.9)	3.2[c] (1.7–6.3)	9.2[c] (5.2–16.4)	2.7[c] (1.3–5.5)
Demographics				
Caucasian	1.0	1.0	1.0	1.0
African- American	2.5[c] (1.5–4.2)	2.3[d] (1.4–6.2)	3.2[c] (1.8–5.8)	3.5[d] (1.5–8.3)
Hispanic	.6 (.2–1.7)	.7 (.2–2.4)	.8 (.2–2.4)	1.2 (.3–4.5)
Asian	1.261 (.8–2)	1.7 (1–3.1)	1.2 (.7–2.2)	1.9 (.9–3.9)
Other	1.044 (.6–1.7)	1.4 (.7–2.5)	1.2 (.6–2.1)	1.5 (.7–3.5)
Sexual orientation				
Heterosexual	1.0	1.0	1.0	1.0
Mostly heterosexual or	1.5[e] (1–2.2)	.7 (.4–1.1)	1.7[e] (1–2.7)	.4 (.4–1.5)
Bisexual	3[c] (1.8–5.1)	1.3 (.6–2.5)	3.1[c] (1.6–6)	1.5 (.6–3.3)
Mostly gay/lesbian or gay/lesbian	3.2[c] (1.8–5.7)	2.5[e] (1.2–5.3)	5.1[c] (2.8–9.3)	4.3[c] (1.9–9.6)
Socioeconomic Status (SES)	.9[d] (.8–.9)	.9[e] (.8–.9)	.9[e] (.8–.9)	.9 (.8–1)
Psychological and social variables				
Pessimistic cognitive style	2[c] (1.7–2.3)	1.2[e] (1.1–1.5)	1.7[c] (1.5–2.1)	1.2 (.9–1.5)
Presence of meaning in life	.5[c] (.4–.6)	.8[e] (.6–.9)	.6[c] (.5–.7)	.9 (.7–1.1)
Number of confidant categories	.9[c] (.8–.9)	.8[c] (.8–.9)	.9[d] (.8–.9)	.9[d] (.8–.9)
Perceived peer isolation	1.6[c] (1.4–1.6)	1.1 (.8–1.3)	1.4[c] (1.1–1.6)	1.1 (.9–1.4)
Acceptance of emotion	.5[c] (.5–.7)	.9 (.7–1)	.6[c] (.5–.7)	.9 (.7–1.1)
Mental health, trauma, and treatment variables				
Psychological distress (K-6)				
Low	1.0	1.0	1.0	1.0
Moderate	3.6[c] (2.6–4.9)	1.9[d] (1.2–2.8)	3.2[c] (2.2–4.9)	2[d] (1.3–3.3)
High	6.6[c] (4.1–10.4)	1.1 (.6–2.2)	5.6[c] (3.3–10.2)	1.5 (.7–3.2)
Perception of ever having suffered from a mental illness	4.6[c] (3.4–6.2)	2[c] (1.2–3.2)	4.9[c] (3.3–7.2)	1.8 (.9–3.3)
Ever diagnosed with mental illness	6.7[c] (4.9–9.2)	1.8[e] (1.1–2.9)	8.4[c] (5.8–12.3)	3.1[c] (1.7–5.5)
History of life trauma	2.6[c] (1.6–4.3)	1.9[e] (1–3.5)	2.5[d] (1.4–4.8)	1.7 (.8–3.4)
Ever having been in mental health treatment	3.6[c] (2.6–4.9)	2.3[c] (1.5–3.4)	3.8[c] (2.7–5.7)	2.2[c] (1.4–3.6)

[a] The variables included in these analyses are only those significant in preliminary univariate analyses. Wave was also included as a control variable in the adjusted model to account for variation in event history captured as a function of time (e.g., wave 1 included lifetime history to that point while wave 2 & 3 included past year only).

[b] Highest cumulative lifetime prevalence prior to report of suicide-related thoughts/behavior.

[c] $p < .001$.

[d] $p < .01$.

[e] $p < .05$.

NSSI prior to SB and 11.1% (n = 14) report SB prior to NSSI. Another 34.9% (n = 44) report engaging in SB and NSSI concurrently and 46% (n = 58) report no NSSI history.

Discrete time analysis was used to examine the assumption that history of NSSI prior to or concurrent with STB will predict later STB independent of major underlying factors common to both. NSSI prior to and concurrent with STB were examined together to enhance sample size and because there is clinical usefulness in knowing whether current NSSI may be contributing to current or later STB. Variables originally entered include data collection time point (wave), number of NSSI incidents reported at Time 1, demographic (sex, sexual orientation, ethnicity, socioeconomic status, age), psychosocial, mental health, trauma, and history of mental health treatment variables. All variables in analyses were taken from Time 1 reports and were examined individually and then as entered stepwise by block (e.g., demographic, psychosocial) into the final model. Interactions between all variables and time points were included in preliminary models; none were significant and were dropped in later models. NSSI was entered categorically based on frequency. The table and adjusted model includes only variables significant in the univariate analyses.

Table 2 shows the final model for STB and SB. As hypothesized, any history of NSSI did significantly predict any later STB (AOR 2.8, 95% CI 1.9–4.1) and SB (AOR 2.6, 95% CI 1.6–4.1) even when covariates are included in the model. As shown in Table 2, when compared to no NSSI incidents, there is a dose-response relationship between highest NSSI frequency reported and later STB until the 6–20 NSSI incidents category, after which risk of later STB plateaus or decreases. When the last two categories are collapsed for analyses, results show that individuals with NSSI frequency > 5 before STB are 4 times (95% CI, 2.4–6.5) more likely than those with no NSSI history to report any STB and 3.4 times (95% CI, 2–5.9) to report SB even when covariates are included in the model.

Predicting STB risk within the NSSI positive group

The final model was designed to identify variables that contributed to later STB among individuals with a history of NSSI. Therefore, this analysis was restricted to the 253 participants who displayed any non-zero level of NSSI *prior to* or *concurrent with* any STB (n = 58) or who possessed a history of NSSI but who never exhibited any STB (n = 195). Participants who displayed STB before NSSI were excluded from the analysis. The analyses utilized binary logistic regression in which the outcome indicated whether the participant reported any STB in the same or a later time point of data collection.

As in the previous analysis, variables were examined individually, in multivariate models within blocks (NSSI frequency, demographics, psychosocial variables, mental health, and trauma-related variables), and then as entered stepwise by block into the final model. NSSI frequency was entered using lifetime frequency reported at Time 1. Instead of using number of confidant categories as above, specific categories of confidants (e.g., parents, healthcare providers) were included as a means of exploring whether one's choice of confidant predicts suicide risk among individuals with NSSI history: no one, peers only, peers and professionally affiliated adults, peers and professional adults plus informal social network adults except parents, and all of the previous plus parents. Confidant categories separated parents from other non-professionally affiliated adults (such as mental or physical health providers) because preliminary analyses suggested parents may play a unique role in understanding suicide risk in this group.

As shown in Table 3, the final adjusted model shows that greater than 20 lifetime NSSI incidents (AOR 3.8, 95% CI, 1.4–10.3) and ever having been in mental health treatment (AOR 2.2, 95% CI, 1.9–4.6) are associated with greater risk of moving from NSSI to later STB. In contrast, reporting a sense of presence of meaning in life (AOR .6, 95% CI, .5–.7) and reporting parents as confidants (AOR, .3, 95% CI, .1–.9) are associated with reduced risk of moving from NSSI to STB. More specifically, when specific confidant categories were not included in the model, pessimistic cognitive style, number of confidants, and perceived social isolation were all predictive of later STB when entered into the adjusted model separate of other psychosocial variables. High correlation (though not multicollinear as variance inflation factor (VIF) scores were all < 5) among the psychosocial variables tended to mask the effects of individual variables in the multivariate model.

Comment

This study was intended to deepen understanding of the relationship between NSSI and STB with specific interest in understanding three issues with clinical and public health relevance: (1) the temporal relationship between NSSI and STB; (2)

Table 3
Predictors of later suicide-related thoughts/behavior among individuals with NSSI history (n=253)[a]

Characteristic	Odds ratio (95% CI)	
	Post NSSI development of any suicide-related thoughts/behavior	
	Unadjusted model	Adjusted model
NSSI lifetime frequency at Time 1[b]		
≤1	1.0	1.0
2–5	1.9 (.8–4.4)	1.6 (.9–4)
6–20	3.1[e] (1.2–8.2)	2.5 (.9–7.2)
>20	5.7[c] (2.4–13.4)	3.9[d] (1.5–10.2)
Pessimistic cognitive style	1.7[d] (1.2–2.5)	1.1 (.6–1.9)
Presence of meaning in life	.6[c] (.5–.8)	.7[d] (.5–.9)
Perceived peer isolation	1.4[d] (1.1–2)	1.4 (.9–2.5)
Acceptance of emotion	.7[d] (.6–.9)	.9 (.6–1.3)
Confidant categories		
No one	1.0	1.0
Peers only	.8 (.3–2.1)	1 (.3–3.1)
Peers and adult professionals	1.1 (.3 – 3.5)	1 (.2–4)
All others plus informal adults but not including parents	.4 (.1–1.8)	.7 (.1–3.1)
All others including parents	.2[d] (.1–.6)	.3[e] (.1–.9)
Mental health and treatment variables		
Psychological distress		
Low	1.0	1.0
Moderate	2.3[d] (1.2–4.5)	1.4 (.7–3)
High	3.7[d] (1.5–8.9)	1.5 (.5–4.5)
Ever have been diagnosed with mental illness	2.5[d] (1.3–4.6)	1.2 (.5–2.7)
Mother history of mental illness	2[e] (1.1–3.7)	1.6 (.8–3.2)
Ever having been in mental health treatment	2.6[c] (1.4–4.7)	2.2[e] (1.9–4.6)

[a] The variables included in these analyses are only those significant in preliminary univariate analyses.
[b] Highest cumulative lifetime prevalence prior to report of suicide-related thoughts/behavior.
[c] $p < .001$.
[d] $p < .01$.
[e] $p < .05$.

the extent to which NSSI reduces inhibition to STB; and (3) identification of clinically accessible indicators that may help clinicians identify individuals with NSSI history at elevated risk for STB. Temporal analyses suggested that NSSI was equally likely to appear prior to STB as it was to occur following STB. Finding that any NSSI history prior to STB nearly triples the risk for concurrent or later STB and shows a dose-response relationship despite shared risk factors is consistent with the habituation hypothesis [12] and with prior research [3,6]. It is important to note, however, that we were not able to control for all variables that may explain the link between NSSI and later progression to STB, such as shame, self-hatred, and personality characteristics.

Findings also confirm that individuals with NSSI history who are at heightened risk for later or concurrent STB differ from each other in the severity of psychological and social indicators. The final analysis suggested that individuals in this group at risk for concurrent or later STB have a higher lifetime NSSI frequency, feel less socially connected to critical supports (such as parents), experience a lower sense of meaning in life, and seek more mental health services than their nonsuicidal peers. The role of parents as a protective factor in the later development of STB is particularly interesting in light of the fact that this is a college population. While including adult professionals showed no added value (probably because it serves as a proxy for elevated distress), it is clear that reporting adults, particularly parents, as confidants confers protection above and beyond peers. Lastly, basic descriptive information on incidence rates of both NSSI and STB suggest that rates of new cases of both NSSI and STB slow considerably in young adulthood, with most onset reported prior to time 1 data collection. Incidence data in combination with number of NSSI episodes in prior year are germane to the proposed DSM-V criteria for NSSI.

Overall, findings support the idea that NSSI may serve as a "gateway" for concurrent or later STB and more serious SB and underscore the need for early NSSI response and intervention. NSSI is rarely cited in empirical suicide research as a notable STB risk factor and is often dismissed as adolescent attention seeking behavior of generally low concern when unaccompanied by other clinical markers [3,9,11]. Including NSSI assessments as part of routine medical and health screenings in adolescent and young adult populations may be one way to identify young people at risk for STB. It also reinforces the call for STB assessment when NSSI is present [3,5] and for periodic STB assessment even for individuals who have tested negative for STB in the past or who are not currently engaging in NSSI.

The current analyses are unique in their objective and approach, contributing to the fledgling body of knowledge describing the particularities of the NSSI-STB relationship. They are not, however, without limitations and raise additional questions for consideration. For example, the temporal findings raise the question about the extent to which NSSI and STB are phenomenologically distinct or best viewed as part of a continuum, as has been argued [36]. Of similar interest is the possibility that STB may both predict and contribute to later development of NSSI. Although the directionality of these analyses were those assumed to have the most clinical relevance (due to increase in lethality), reversing this contains interesting implications. Moreover, long periods between measurement points (one year) limited discernment of temporal relationship between the two behaviors. Because of this, significant numbers of respondents indicated initiating NSSI and STB within the same year, all of which were coded as "concurrent," but which may not have been. Lastly, although the mechanisms governing the relationship between NSSI and STB are not likely to vary considerably by population, this study was conducted in a largely urban, northeastern college population and may not be generalizable to other populations.

In closing, the findings reported in this study are a critical step toward understanding the temporal relationship between NSSI and STB risk and underscore the need for standardized NSSI assessment as part of STB risk protocols.

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