Depression, Self-Criticism, and Nonsuicidal Self-Injury Urges:

A Prospective Investigation in Young Adults

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Abstract

Nonsuicidal self-injury (NSSI) is associated with significant distress, impairment, and suicide risk among young adults. Negative affectivity and self-critical cognitions are linked to NSSI but have rarely been considered jointly alongside indicators of NSSI severity. To address this gap, we examined depressive symptoms and self-criticism as concurrent and prospective predictors of NSSI urges among depressed young adults over six weeks. Baseline NSSI severity was positively related to baseline depressive symptoms, which predicted follow-up NSSI urges; however, baseline depressive symptoms did not predict later NSSI urges when controlling for baseline NSSI severity. In contrast, self-criticism was not associated with baseline NSSI severity but predicted follow-up NSSI urges, even when controlling for prior NSSI severity. Using within-person longitudinal path models, depressive symptoms were positively associated with NSSI urges at the same assessment but did not prospectively predict later NSSI urges; however, self-criticism did predict later NSSI urges but not concurrent NSSI urges. Thus, depressive symptoms may indicate overall NSSI risk but may be less informative than self-criticism in predicting within-person changes in NSSI urges over time. These findings inform NSSI theories and highlight potential NSSI prevention and intervention targets.

Keywords: nonsuicidal self-injury; NSSI; self-criticism; depression; longitudinal

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Nonsuicidal self-injury (NSSI) is the deliberate, self-inflicted damage to bodily tissue without suicidal intent and for purposes that are not socially sanctioned (International Society for the Study of Self-Injury, 2018). NSSI often begins in adolescence or young adulthood (Klonsky, 2011) and is highly prevalent among college students (e.g., approximately 10.3% during their first year; Kiekens et al., 2019). Of great concern, individuals who engage in NSSI are at markedly elevated risk for suicidal thoughts and behaviors, including suicide attempts and death by suicide (Ribeiro et al., 2016). Although urges to engage in NSSI (i.e., NSSI urges) are distinct from NSSI behaviors, they are associated with increased NSSI risk (Nock et al., 2009; Washburn et al., 2010) and, independently, with distress and impairment (Washburn et al., 2010). Thus, research is needed to clarify risk factors for NSSI urges, such as depression symptoms, self-criticism, and characteristics of NSSI history.

Theoretical models of NSSI causality highlight the importance of understanding motivating and maintaining factors as well as experiences that may decrease the odds of NSSI. Models emphasizing experiential avoidance (Chapman et al., 2006) suggest that NSSI is often used to stop or escape from intensely distressing cognitions or emotions; research into the self-reported functions of NSSI supports this conceptualization, as NSSI is typically described as a method of emotion regulation and self-punishment (Klonsky et al., 2015; Taylor et al., 2018). Recent meta-analyses focused on real-time measurement show that both NSSI urges and behaviors are preceded by increases in negative affect, and followed by decreases in negative affect, indicating that these experiences may, at least temporarily, serve this desired function (Kuehn et al., 2022).

The benefits and barriers model of NSSI (Hooley & Franklin, 2018) demonstrates that the benefits of NSSI are likely broadly applicable, but NSSI occurs only when relevant barriers are not present. This model highlights the utility of NSSI to decrease negative affect, gratify the desire for self-punishment, and facilitate interpersonal goals. However, one key barrier to engagement is positive views of oneself, essentially the inverse of self-criticism; thus, understanding the concurrent influences of negative emotionality and (low) positive self-views (high self-criticism) may be important in understanding the risk for NSSI urges and behaviors.

NSSI has been associated with various psychopathological experiences, including internalizing disorders and those with core diagnostic components that cover affective dysregulation (Bentley et al., 2015; Turner et al., 2018). NSSI is particularly common among individuals with mood disorders, such as depression and bipolar disorder. Depression, in particular, is associated with clinically significant NSSI (e.g., above the threshold for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [DSM-5] NSSI Disorder) among college students (Kiekens et al., 2018). Depressive symptoms also prospectively predict NSSI in adolescence after controlling for other relevant experiences (Zhu et al., 2020). These diagnoses are characterized by intense, sometimes volatile, negative affective experiences (Hepp et al., 2017), which can trigger NSSI (Kiekens et al., 2020; Victor et al., 2019). Both self-report (Claes et al., 2010) and ecological momentary assessment (Burke et al., 2021a; Hepp et al., 2021) research demonstrate that negative affective experiences in those with depressive disorders prompt NSSI urges and behaviors over short periods of time and that NSSI itself transiently decreases negative affect, further reinforcing self-injury (Gordon et al., 2010; Kuehn et al., 2022). The link between depressive symptoms and NSSI broadly has been well established; however, additional research is needed to understand the link between depressive symptoms and

NSSI urges over time, especially over intervals relevant to monitoring treatment progress, for instance, on a week-to-week basis. This need contrasts with prior intensive longitudinal research, which has primarily focused on negative affective states (Kuehn et al., 2022; Rodríguez-Blanco et al., 2018), rather than depressive symptoms broadly, which include, but are not limited to, negative emotionality.

Although psychopathology that co-occurs with NSSI typically includes negative affect as a core component, they are also often characterized by feelings of worthlessness, excessive guilt, poor self-image, and unstable identity (Gad et al., 2019; Zahn et al., 2015). Self-relevant negative emotions, such as shame and self-disgust, are particularly connected to NSSI (Victor et al., 2014), highlighting the potentially important role of self-criticism as a risk factor for NSSI urges and behaviors (Zelkowitz & Cole, 2019). Although measures of self-criticism vary in item content and emphasis, self-criticism, as examined in relation to NSSI, includes negative cognitions directed towards the self, including self-hatred, feelings of inadequacy, and the tendency to view oneself as failing to live up to their own expectations, standards, or self-goals (Rudich et al., 2008; Zelkowitz & Cole, 2019). Self-criticism has shown a prospective association with NSSI (Perkins et al., 2020), and some ecological momentary assessment work supports an association between self-criticism and NSSI behavior history (Burke et al., 2021b) as well as short-term prediction of NSSI urges (Burke et al., 2021c). Taken together, both depression symptoms and self-criticism may serve as important, clinically relevant predictors of NSSI urges.

Research elucidating the possible mechanisms underlying NSSI has expanded over the past few decades but has been limited by a focus on primarily cross-sectional, correlational methods to examine associations between affective and cognitive experiences and NSSI

engagement, for instance, demonstrating associations between self-criticism, depression, and NSSI (Chen et al., 2022). These methodologies are unable to clarify which NSSI correlates may serve as consequences, versus causes, of NSSI, due to the inability to examine temporal associations between potential risk factors and NSSI itself. Further, much of this research examines lifetime NSSI as the outcome of interest, which precludes examination of factors associated with continued (versus ceased) NSSI and may be subject to recall biases (Robinson & Wilson, 2020). Even prospective work has typically considered changes in NSSI over months or years (Fox et al., 2015); while informative, this research often lacks the temporal resolution to examine the ordering of changes in NSSI risk factors between assessment windows. Therefore, further research is needed to examine risk factors for NSSI urges over shorter timeframes, which is likely more informative regarding real-world NSSI risk (Rodríguez-Blanco et al., 2018). This work may be especially critical to understand NSSI risk among depressed college students, a population with high rates of NSSI behaviors (Swannell et al., 2014), NSSI Disorder (Kiekens et al., 2018), and barriers to treatment engagement (Eisenberg & Chung, 2012).

To meet this need in the literature, better inform prevention and intervention of real-world NSSI, and examine prospective predictors of NSSI urges among those at highest risk, we utilized a four-wave, six-week longitudinal design examining risk for NSSI urges among young adults with elevated depressive symptoms and a history of NSSI ($n = 92$). First, we examined how baseline NSSI characteristics known to be associated with clinical severity (recency, frequency, number of methods) contributed to NSSI urges reported over the six-week follow-up period. We hypothesized that participants with more recent (1A), more frequent (1B), and more versatile (e.g., a greater number of methods; 1C) NSSI would exhibit elevated NSSI urges across the follow-up period. Second, we considered how baseline measures of depressive symptoms and

self-criticism may relate to follow-up NSSI urges. We hypothesized that both baseline depressive symptoms (2A) and self-criticism (2B) would independently and positively predict follow-up NSSI urges. We further hypothesized that these positive associations with depressive symptoms (2C) and self-criticism (2D) would no longer be significant after controlling for baseline characteristics of NSSI, which we expected to be positively correlated with baseline depressive symptoms and self-criticism. This prediction is based on prior work showing that NSSI severity positively predicts NSSI urges and behaviors over time (Glenn & Klonsky, 2011; Kranzler et al., 2018; Riley et al., 2015; Zielinski et al., 2017), leaving relatively less variance in follow-up NSSI urges to be explained by the unique contributions of depression and self-criticism. Finally, we investigated how depressive symptoms and self-criticism reported at each follow-up wave would contribute to concurrent and prospective (lagged) NSSI urges. We hypothesized that within-person elevations in both depressive symptoms (3A) and self-criticism (3B) over time, relative to each person's own estimated average experiences over follow-up, would be positively associated with concurrently reported NSSI urges, controlling for prior assessment NSSI urges and depressive symptoms or self-criticism. We treated the examination of depressive symptoms and self-criticism as prospective predictors of NSSI urges at the next follow-up as exploratory, as prior research in this area is limited.

Method

Participants and Procedures

Participants were young adult college students recruited from a large, public university in the southwestern United States for a study on depression (demographic details below). The study was advertised using physical and virtual advertisements distributed across campus and via email to the entire student body weekly, and participants were paid with an Amazon gift card (rather

than via course credit). Thus, the sample is likely more representative of the student body

generally, relative to studies that recruit from Psychology Department subject pools. All study

procedures were approved by the university's Institutional Review Board and conducted

following American Psychological Association ethical standards.

Interested individuals ($N = 327$) completed an online screening for the study using the

Patient Health Questionnaire 9-item version (PHQ-9; Kroenke & Spitzer, 2002). Students who

scored in the moderate depression range or higher (total score ≥ 10; $n = 290$) were invited to

complete an in-person baseline assessment battery in a campus laboratory; a total of 152 students

(52.4% of qualifying interested individuals) completed the baseline assessment battery (T1).

Eligible participants were required to be age 18 to 25 at prescreening, enrolled in-person as a

full-time student at the authors' university, and have a PHQ-9 total score ≥ 10 on the

prescreening assessment; NSSI history was not required for eligibility in the parent study. The

session involved completing various self-report questionnaires, as well as the Minnesota

Multiphasic Personality Inventory-2-Restructured Form-Expanded (MMPI-2-RF-EX), an

enhanced version of the MMPI-2-RF (Ben-Porath & Tellegen, 2008/2011), from which the

MMPI-2-RF may be scored (Hall et al., 2022). The parent study was designed to validate the

updated MMPI-2-RF-EX in a clinically relevant sample of young adults experiencing heightened

levels of internalizing psychopathology. This actuarial-based predictive research approach (see

Grove, 2005 for a review) on the MMPI family of instruments stems from its wide use in

professional practice and training programs (Ingram et al., 2022; Wright et al., 2017), as well as

its effective identification of various diagnostic presentations (e.g., depression, suicide, and

NSSI; Anestis et al., 2018; Kim et al., 2021; Kremyar & Wygant, 2023; McCord & Provost,

2020; Morris et al., 2023; Tarescavage et al., 2021; Whitman et al., 2021) and effective

measurement of contemporary models of psychopathology (e.g., Forbes et al., 2024; Sellbom et al., 2021; Wendt et al., 2023).

Participants were sent a link via email and text message to access web-based questionnaires at two (T2), four (T3), and six (T4) weeks following the baseline session (T1). Two-week intervals were used given the primary study aims of examining depressive symptom fluctuations, as criteria for a major depressive episode requires a two-week duration, and many measures of depressive symptoms are thus keyed to a 14-day period. Three follow-up assessments over six weeks were used due to feasibility (e.g., difficulty maintaining enrollment of college students in a longer study which would be more likely to span academic term break periods). The measures in these questionnaires were keyed to experiences, thoughts, and feelings over the preceding two-week interval (see below). The survey was available for 24 hours.

Data were removed for participants with an invalid MMPI-2-RF profile ($n = 13$) and/or incorrect answers on more than one of five attention check items embedded within the Qualtrics questionnaire battery ($n = 2$) during their in-person session, leaving 137 individuals with valid baseline data. No attention checks were administered on follow-up assessments due to their brevity. Of these, 123 (89.78%) completed at least one follow-up wave, and 104 (75.91%) reported a lifetime history of NSSI. The analytic sample for this manuscript is comprised of 92 individuals (67.15% of the total sample) who reported lifetime NSSI at baseline and completed at least one follow-up survey.

Measures

Demographics

Participants were asked to self-report age (in years), gender identity, race, ethnicity, and recent (past month) mental health treatment, which were examined as potential covariates in our analyses of interest (see below).

Depressive Symptoms

The PHQ-9 (Kroenke & Spitzer, 2002) assessed depressive symptoms at baseline and each follow-up assessment. The PHQ-9 is keyed to symptoms experienced in the past two weeks to ensure consistency with the diagnostic timeframe for a major depressive episode. For example, participants are asked how often, over the past week, they have been bothered by "little interest or pleasure in doing things" as an indicator of anhedonia. Participants rate nine items on a four-point response scale ranging from 0 (*not at all*) to 3 (*nearly every day*), such that higher scores indicate greater depressive symptoms. PHQ-9 total scores showed adequate internal consistency at baseline ($\alpha = .75$) and at each follow-up (T2 $\alpha = .82$, T3 $\alpha = .83$, T4 $\alpha = .82$). PHQ-9 scores were moderately correlated over time (rs $= .44 - .62$).

Self-criticism

Self-criticism was assessed with the Depressive Experiences Questionnaire Self-Criticism 6 (DEQ-SC6), a well-validated measure of self-critical feelings and beliefs (Blatt et al., 1976; Rudich et al., 2008). Participants rate six items assessing how they feel about themselves on a seven-point response scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*); an example item is "I find it hard to accept my weaknesses." Higher scores are indicative of greater self-criticism. The DEQ-SC6 total score showed adequate internal consistency at baseline ($\alpha = .65$) and at follow-up (T2 $\alpha = .67$, T3 $\alpha = .70$, T4 $\alpha = .74$). Instructions were modified for follow-up

surveys to assess these experiences over the preceding two weeks. DEQ-SC6 scores were correlated over time (rs = .43 –.73).

NSSI Behaviors, Characteristics, and Urges

At baseline, participants completed items from the Inventory of Statements About Self-Injury (ISAS; Klonsky & Olino, 2008), which assesses 12 NSSI methods and allows participants to write an optional "other" category. Participants are asked to report the number of times they have engaged in each NSSI method. These responses are then used to create measures of NSSI frequency (the sum of frequency responses across methods) and NSSI versatility (the number of methods for which the participant endorsed any engagement). Participants were also asked to indicate the most recent time they engaged in NSSI, measured ordinally (*past week* = 6, *past month* = 5, *past three months* = 4, *past six months* = 3, *past year* = 2, *prior to the past year* = 1). Participants were also asked how many days they engaged in NSSI in the past year (count) and whether, before the past year, they had engaged in NSSI at least five times within a single year period (*yes* or *no*). Baseline NSSI characteristics are available in Table 1.

At each follow-up survey, participants responded to the item, "Over the past two weeks, how often have you had the urge or desire to engage in self-harm [i.e., intentionally injuring yourself without suicidal intent]?") using a seven-point rating scale ranging from *never* (1) to *nearly all the time* (7), where values of 2 or higher indicated the presence of NSSI urges. Participants were also asked whether they had engaged in NSSI during that two-week interval, with response options *no*, *yes, once*, and *yes, more than once*. Characteristics of follow-up NSSI urges and behaviors are provided in Table 2.

Table 1

NSSI Characteristics Reported at Baseline

Variable	*n* (%)	*M* (*SD*)
Lifetime NSSI	92 (100)	
5+ Days in Any Year with NSSI	61 (67.0)	
Total Number of NSSI Episodes		1430 (10450.9)
Lifetime NSSI Methods		4.2 (2.3)
Interference with wound healing	62 (67.4)	
Cutting	56 (60.9)	32.8 (88.4)
Banging/Hitting	49 (53.3)	33.7 (95.3)
Pinching	43 (46.7)	38.2 (104.7)
Pulling hair	37 (40.2)	21.7 (70.0)
Severe scratching	39 (42.4)	27.1 (90.8)
Biting	34 (37.0)	39.7 (146.3)
Burning	19 (20.7)	1.9 (7.6)
Swallowing dangerous substances	15 (16.3)	2.9 (12.8)
Rubbing with rough surfaces	15 (16.3)	6.2 (42.0)
Sticking self with needles	7 (7.6)	7.5 (62.6)
Other	6 (6.5)	12.1 (104.4)
Carving	5 (5.4)	0.5 (2.5)
Most Recent NSSI		
Past Week	15 (16.3)	
Past Month	29 (31.5)	
Past 3 Months	42 (45.7)	
Past 6 Months	48 (52.2)	
Past 12 Months	54 (58.7)	
More than 12 Months Ago	28 (30.4)	
Do Not Remember	10 (10.9)	
Past Year NSSI		
5+ Days in Past Year with NSSI	38 (41.8)	
Total Number of Days with NSSI		21.0 (47.9)

Note. NSSI = nonsuicidal self-injury. Whether or not participants had 5+ days of NSSI in any single year was missing for *n* = 2 individuals, and in the past year was missing for *n* = 3 individuals. The number of days of NSSI engagement in the past year was missing for *n* = 2 individuals. The most recent NSSI episode was missing for *n* = 1 participant.

Table 2

NSSI Descriptive Characteristics Reported at Each Follow-up

Variable	Wave 2 (*n* = 78) *n* (%)	Wave 3 (*n* = 77) *n* (%)	Wave 4 (*n* = 72) *n* (%)
NSSI Urges			
Never	37 (47.4)	49 (63.6)	46 (63.9)
Rarely	20 (25.6)	15 (19.5)	15 (20.8)
Occasionally	12 (15.4)	9 (11.7)	6 (8.3)
Sometimes	8 (10.3)	2 (2.6)	3 (4.2)
Often	0 (0)	2 (2.6)	1 (1.4)
Most of the time	1 (1.3)	0 (0)	1 (1.4)
Nearly all of the time	0 (0)	0 (0)	0 (0)
Any NSSI Urge Endorsed	41 (52.6)	28 (36.4)	26 (36.1)
NSSI Behavior			
No	72 (92.3)	73 (94.8)	68 (94.4)
Yes, once	3 (3.9)	4 (5.2)	2 (2.8)
Yes, more than once	3 (3.9)	0 (0)	2 (2.8)
Any NSSI Behavior Endorsed	6 (7.7)	4 (5.2)	4 (5.6)

Note. NSSI = nonsuicidal self-injury. All participants who endorsed NSSI behavior at a specific

assessment also endorsed non-zero NSSI urges.

Data Analytic Plans and Procedures

First, we examined the distributions of our study variables. Lifetime NSSI frequency was

highly skewed (9.55) and kurtotic (91.4); as a result, we rank-transformed this variable for

analyses, with the lowest rank (1) assigned to the lowest NSSI frequency for interpretability.

Next, we examined potential demographic covariates and baseline NSSI characteristics

(frequency, recency, number of methods) for associations with NSSI urges reported at follow-up.

Constructs that were significantly associated with follow-up NSSI urges were included as

covariates in binary logistic regression models for hypotheses 1A – 1C and 2A – 2C. These

models were used to test the odds of any NSSI urges over follow-up, predicted by baseline

depressive symptoms, self-criticism, and indicators of NSSI severity. Given the moderate

correlations between baseline depression and self-criticism ($r = .43$), depression and self-criticism were modeled as predictors in separate regressions. Participants were dichotomized into those who rated NSSI urges at 1 at all follow-up surveys (0) and those who rated this item 2 or higher for at least one follow-up survey (1), given the overall low ratings of NSSI urges and the lack of hypotheses regarding post-hoc comparisons across the ordinal NSSI urge rating scale. Analyses were conducted in SPSS version 28, and the results are presented using standardized effect sizes.

For hypotheses 3A–3B, we tested a longitudinal model using Mplus version 8.5 (Muthén & Muthén, 2021), where NSSI urges, depressive symptoms, and self-criticism were nested within people over time. NSSI urges were specified as categorical, using the full 7-item scale, and all variables were regressed on themselves (auto-regressive effects) and on each other (cross-lagged effects), testing the relationships between constructs controlling for stability in experiences over time. This means that all within-person parameters can be conceptualized as a participant's deviation, whether positive or negative, from their own aggregated mean levels across the follow-up interval. Variables were allowed to predict each other or covary within the same assessment, permitting examining concurrent effects, and controlling for auto-regression from the prior time point. Parameters were set to equivalency across follow-up intervals (e.g., the auto-regressive effect of NSSI urges from T2 to T3 was set to be equivalent to the same effect from T3 to T4, and auto-regressive effects of depressive symptoms and self-criticism from T1 to T2, T2 to T3, and T3 to T4) due to the small sample size, concerns regarding degrees of freedom within the model, and lack of hypotheses related to differences across follow-up windows (e.g., we did not predict that depression and self-criticism would be more important from baseline to two weeks later than between the four- and six-week follow-ups, or vice versa). Models were

calculated using maximum likelihood estimation with robust standard errors, and Monte Carlo

integration was used to handle missing data. A correlation matrix of study variables, which

includes their means and standard deviations at all time points, is provided in Table 3.

Table 3

Correlation Matrix of Study Variables

Variables	T1 NSSI			Follow-Up NSSI Urges			PHQ-9				DEQ-SC6			
	FR	MT	RC	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
NSSI MT	**.57 (92)**	1												
NSSI RC	**.34 (82)**	**.33 (82)**	1											
T2 NSSI Urges	**.24 (78)**	**.31 (78)**	**.43 (71)**	1										
T3 NSSI Urges	**.38 (77)**	**.43 (77)**	**.38 (70)**	**.47 (65)**	1									
T4 NSSI Urges	**.24 (72)**	**.21 (72)**	**.30 (65)**	**.49 (61)**	**.27 (60)**	1								
T1 PHQ-9	**.37 (92)**	**.23 (92)**	**.23 (82)**	**.34 (78)**	**.28 (77)**	**.34 (72)**	1							
T2 PHQ-9	**.28 (78)**	.16 (78)	.14 (71)	**.45 (78)**	**.36 (65)**	**.32 (61)**	**.45 (78)**	1						
T3 PHQ-9	**.30 (77)**	.17 (77)	.01 (70)	.07 (65)	**.43 (77)**	.09 (60)	**.44 (77)**	**.53 (65)**	1					
T4 PHQ-9	**.38 (72)**	.13 (72)	.16 (65)	.10 (61)	**.27 (60)**	**.49 (72)**	**.57 (72)**	**.47 (61)**	**.62 (60)**	1				
T1 DEQ-SC6	.12 (92)	.20 (92)	.12 (82)	**.29 (78)**	.09 (77)	.20 (72)	**.43 (92)**	.13 (78)	.11 (77)	**.30 (72)**	1			
T2 DEQ-SC6	.14 (78)	.15 (78)	.06 (71)	.20 (78)	**.33 (65)**	**.26 (61)**	.22 (78)	**.36 (78)**	.15 (65)	**.34 (61)**	**.56 (78)**	1		
T3 DEQ-SC6	.00 (76)	.02 (76)	.13 (69)	.08 (64)	.18 (76)	.22 (59)	**.31 (76)**	**.34 (64)**	**.39 (76)**	**.49 (59)**	**.43 (76)**	**.53 (64)**	1	
T4 DEQ-SC6	**.26 (72)**	.17 (72)	.00 (65)	.03 (61)	.16 (60)	.18 (72)	**.49 (72)**	**.27 (61)**	**.26 (60)**	**.55 (72)**	**.63 (72)**	**.71 (61)**	**.73 (59)**	1
M	1430.5	4.2	3.3	1.9	1.6	1.6	8.1	13.6	12.4	11.8	5.4	5.2	5.1	5.1
(*SD*)	(10450.9)	(2.3)	(2.0)	(1.1)	(1.0)	(1.1)	(3.9)	(5.1)	(5.2)	(5.1)	(0.9)	(0.9)	(1.0)	(0.9)

Note. Bolded values are statistically significant at $p < .05$; the sample size for each correlation is presented parenthetically. Abbreviations: NSSI = nonsuicidal self-injury; FR = lifetime NSSI frequency (rank-transformed); MT = lifetime NSSI number of methods; RC = NSSI recency; PHQ-9 = Patient Health Questionnaire 9-item; DEQ-SC6 = Depressive Experiences Questionnaire Self-Criticism 6; T1 = time 1 (baseline data); T2 = time 2 (two-week follow-up); T3 = time 3 (four-week follow-up); T4 = time 4 (six-week follow-up). Relationships between NSSI methods, PHQ-9, and DEQ-SC6 scores reflect Pearson's *r* values, whereas all other parameters reflect Spearman's *rho*.

Results

Descriptive Characteristics and Covariate Testing

Prior to analyses using follow-up data, we tested whether variables of interest at baseline differed between participants with any follow-up data and those lost to follow-up. These participants did not differ in demographic features (age, race, ethnicity, sexual orientation), clinical indices (baseline depressive symptoms, baseline self-criticism), or indicators of NSSI severity (recency, versatility, frequency). There was a significant association between gender identity and attrition ($\chi^2(2) = 9.55$, $p = .008$), with higher attrition for transgender and non-binary participants ($n = 3$, 33.3% attrition), followed by cisgender men ($n = 37$, 21.6% attrition) and then cisgender women ($n = 96$, 5.2% attrition).

Participants with follow-up data ranged in age from 18 – 26 ($M = 20.1$, $SD = 1.8$) years and were primarily cisgender women (78.3%) or cisgender men (18.5%; see Table 4 for additional demographic characteristics). Participants were primarily White (77.2%) or Black/African American (7.6%), and over one-quarter of participants were Hispanic/Latinx (28.3%). All participants in these analyses had a lifetime history of NSSI (see Table 1 for characteristics of NSSI). The most reported NSSI methods were interference with wound healing (67.4%), cutting (60.9%), and banging/hitting oneself (53.3%). Over half of the participants (60.9%) reported NSSI urges over follow-up, and 13.0% reported NSSI behaviors, all of whom also reported NSSI urges (see Table 2 for follow-up NSSI characteristics).

Table 4

Demographic Characteristics

Variable	n (%)
Gender Identity	
Cisgender male	17 (18.5)
Cisgender female	72 (78.3)
Transgender male	0 (0.0)
Transgender female	0 (0.0)
Genderqueer/gender non-conforming	2 (2.2)
Prefer not to answer	1 (1.1)
Hispanic/Latinx Ethnicity	26 (28.3)
Race	
White/Caucasian	71 (77.2)
Black/African American	7 (7.6)
Asian/Asian-American	5 (5.4)
American Indian/Alaska Native	1 (1.1)
Native Hawaiian/Pacific Islander	0 (0.0)
Multiracial or other	8 (8.7)

Cisgender men and cisgender women did not differ in rates of follow-up NSSI urges ($\chi^2(1) = 1.42$, $p = .49$), nor did participants with and without recent mental health treatment ($\chi^2(1) = 0.01$, $p = .91$). Non-Hispanic/Latinx White people were more likely to report follow-up NSSI urges than people from other racial/ethnic backgrounds, who were combined into a single group due to small sample sizes for specific races and ethnicities ($\chi^2(1) = 4.27$, $p = .039$). There was weak, non-significant evidence that NSSI at follow-up was associated with younger age ($t(90) = 1.96$, $p = .05$); however, age was not associated with PHQ-9 or DEQ-SC6 scores at baseline or follow-up (all ps > .10). Thus, we elected not to control for age in subsequent analyses. Race/ethnicity (0 = non-Hispanic/Latinx White, 1 = all other racial/ethnic groups) was included as a binary covariate in all models.

Baseline NSSI Severity and Follow-Up NSSI Urges

First, we examined whether the *recency* of NSSI measured at baseline (modeled as a categorical variable, reference group = past-week NSSI) would predict follow-up NSSI urges, controlling for race/ethnicity. Participants who responded "do not remember" for this item were excluded from the analysis. The overall model was significant ($\chi^2(6) = 18.57$, $p = .005$, $R^2 = .20$) and correctly identified 61.96% of participants with respect to follow-up NSSI (see Table 5 for full model results). As hypothesized (1A), baseline NSSI recency was a significant predictor of reporting follow-up NSSI urges, with participants who ceased NSSI over a year ago having lower odds of follow-up NSSI urges compared to those with baseline past-week NSSI ($OR = 0.10$, $p = .007$). No differences were observed for participants with NSSI occurring between one week and one year ago, and participants with past-week NSSI, in predicting follow-up NSSI urges. In a model replacing NSSI *recency* with rank-transformed NSSI *frequency* as a predictor, the model was also significant ($\chi^2(2) = 14.84$, $p < .001$, $R^2 = .15$), correctly identifying 70.65% of participants. Higher baseline NSSI frequency predicted higher odds of follow-up NSSI urges, consistent with hypothesis 1B ($OR = 1.03$, $p = .002$). Consistent with hypothesis 1C, a similar pattern emerged when examining baseline NSSI *versatility* (number of methods) as a predictor of follow-up NSSI urges. The overall model was significant ($\chi^2(2) = 13.09$, $p = .001$, $R^2 = .13$), accurately classifying 67.39% of participants, and more baseline NSSI methods were associated with greater odds of follow-up NSSI urges ($OR = 1.38$, $p = .007$; all model results in Table 5).

Table 5

NSSI Severity Predicting Follow-Up NSSI Urges

Variable	χ^2	df	p	R^2	B	Wald	df	p	OR [95% CI]
Model 1A	18.57	6	.005	.20					
Constant					1.45	3.12	1	.08	4.26
Race					0.69	1.67	1	.20	2.00 [0.70, 5.74]
NSSI Recency 1					-2.33	7.22	1	.007	0.10 [0.02, 0.53]
NSSI Recency 2					-0.97	0.68	1	.41	0.38 [0.04, 3.78]
NSSI Recency 3					-1.68	2.19	1	.14	0.19 [0.02, 1.72]
NSSI Recency 4					-1.45	2.25	1	.13	0.24 [0.04, 1.56]
NSSI Recency 5					0.04	0.001	1	.97	1.04 [0.12, 8.78]
Model 1B	14.82	2	< .001	.15					
Constant					-1.35	6.02	1	.01	0.26
Race					1.17	5.81	1	.02	3.22 [1.24, 8.32]
NSSI Frequency					0.03	9.25	1	.002	1.03 [1.01, 1.05]
Model 1C	13.09	2	.001	.13					
Constant					-1.31	5.23	1	.02	0.27
Race					1.07	5.10	1	.02	2.92 [1.15, 7.40]
NSSI Versatility					0.32	7.33	1	.007	1.38 [1.09, 1.74]

Note. NSSI = nonsuicidal self-injury. R^2 refers to Cox & Snell R^2. B refers to the unstandardized

coefficient. Race was dichotomized such that 0 = non-Hispanic/Latinx White participants, 1 =

participants of all other racial/ethnic groups. NSSI recency was categorized with past week NSSI

as the reference category, such that 1 = more than 12 months ago, 2 = 6–12 months ago, 3 = 3–6

months ago, 4 = 1–3 months ago, 5 = 1 week to 1 month ago. NSSI frequency was rank-

transformed such that larger values indicated higher lifetime frequencies.

Baseline Depression, Self-Criticism, and Follow-Up NSSI Urges

At baseline, depressive symptoms (PHQ-9 scores) were positively correlated with

indicators of NSSI severity (i.e., NSSI versatility, frequency, and recency) and with baseline self-

criticism (DEQ-SC6 scores) (see Table 3). Interestingly, baseline self-criticism was not

significantly associated with indicators of NSSI versatility, frequency, or recency.

As predicted, both baseline depressive symptoms (hypothesis 2A) and self-criticism (hypothesis 2B), when modeled separately, were significantly associated with reporting any follow-up NSSI urges, controlling for race/ethnicity (see Table 6 for full model results). The baseline depressive symptoms model was significant ($\chi^2(2) = 8.75$, $p = .01$, $R^2 = .09$), correctly identifying 68.48% of participants; baseline depressive symptoms were a significant independent predictor of follow-up NSSI urges ($OR = 1.13$, $p = .04$). The baseline self-criticism model was also significant ($\chi^2(2) = 11.43$, $p = .003$, $R^2 = .12$), correctly identifying 66.30% of participants, with a significant effect of self-criticism on odds of NSSI urges ($OR = 1.97$, $p = .01$).

Table 6

Baseline Depression and Self-Criticism Predicting Follow-Up NSSI Urges

Variable	χ^2	df	p	R^2	B	Wald	df	p	OR [95% CI]
Model 2A	8.75	2	.01	.09					
Constant					-0.90	2.71	1	.10	0.41
Race					0.81	3.14	1	.08	2.24 [0.92, 5.47]
Depression					0.13	4.15	1	.04	1.13 [1.01, 1.28]
Model 2B	11.43	2	.003	.12					
Constant					-3.50	5.97	1	.02	0.03
Race					0.75	2.59	1	.11	2.11 [0.85, 5.22]
Self-Criticism					0.68	6.42	1	.01	1.97 [1.17, 3.33]

Note. NSSI = nonsuicidal self-injury. R^2 refers to Cox & Snell R^2. B refers to the unstandardized coefficient. Race was dichotomized such that 0 = non-Hispanic/Latinx white participants, 1 = participants of all other racial/ethnic groups.

When examined in separate models, baseline depressive symptoms were not significantly associated with reporting follow-up NSSI urges after controlling for NSSI frequency, recency, or versatility (ORs < 1.13, ps > .10), supporting hypothesis 2C. In contrast, contrary to hypothesis

2D, baseline self-criticism retained a significant association with follow-up NSSI urges in

models controlling for NSSI severity indicators (ORs > 1.80, ps < .04; see Tables 7 and 8).

Table 7

Baseline Depressive Symptoms Predicting Follow-Up NSSI Urges, Controlling for NSSI Severity

Variable	χ^2	df	p	R^2	B	Wald	df	p	OR [95% CI]
Model 2C1	21.36	7	.003	.23					
Constant					0.55	0.31	1	.58	1.74
Race					0.59	1.15	1	.28	1.81 [0.61, 5.33]
NSSI Recency 1					-2.21	6.38	1	.01	0.11 [0.02, 0.61]
NSSI Recency 2					-0.72	0.36	1	.55	0.49 [0.05, 5.08]
NSSI Recency 3					-1.65	2.07	1	.15	0.19 [0.02, 1.81]
NSSI Recency 4					-1.46	2.20	1	.14	0.23 [0.03, 1.60]
NSSI Recency 5					0.003	0.00	1	.99	1.00 [0.12, 8.61]
Depression					0.11	2.65	1	.19	1.12 [0.98, 1.28]
Model 2C2	15.69	3	.001	.16					
Constant					-1.66	6.44	1	.01	0.19
Race					1.08	4.82	1	.03	2.95 [1.12, 7.77]
NSSI Frequency					0.03	6.34	1	.01	1.03 [1.01, 1.05]
Depression					0.06	0.84	1	.36	1.06 [0.93, 1.22]
Model 2C3	15.07	3	.002	.15					
Constant					-1.82	6.90	1	.01	0.16
Race					0.96	3.95	1	.05	2.60 [1.01, 6.69]
NSSI Versatility					0.28	5.47	1	.02	1.32 [1.05, 1.68]
Depression					0.09	1.92	1	.17	1.09 [0.96, 1.24]

Note. NSSI = nonsuicidal self-injury. R^2 refers to Cox & Snell R^2. B refers to the unstandardized

coefficient. Race was dichotomized such that 0 = non-Hispanic/Latinx white participants, 1 =

participants of all other racial/ethnic groups. NSSI recency was categorized with past week NSSI

as the reference category, such that 1 = more than 12 months ago, 2 = 6-12 months ago, 3 = 3-6

months ago, 4 = 1-3 months ago, 5 = 1 week to 1 month ago.

Table 8

Baseline Self-Criticism Predicting Follow-Up NSSI Urges, Controlling for NSSI Severity

Variable	χ^2	df	p	R^2	B	Wald	df	p	OR [95% CI]
Model 2D1	27.65	7	<.001	.29					
Constant					-3.15	3.05	1	.08	0.04
Race					0.49	0.70	1	.40	1.63 [0.52, 5.05]
NSSI Recency 1					-2.52	7.32	1	.01	0.08 [0.01, 0.50]
NSSI Recency 2					-0.73	0.37	1	.55	0.48 [0.05, 5.15]
NSSI Recency 3					-1.76	2.26	1	.13	0.17 [0.02, 1.71]
NSSI Recency 4					-1.48	1.96	1	.16	0.23 [0.03, 1.80]
NSSI Recency 5					-0.09	0.01	1	.94	0.91 [0.10, 8.73]
Self-Criticism					0.91	7.68	1	.01	2.48 [1.30, 4.70]
Model 2D2	20.44	3	<.001	.20					
Constant					-4.67	8.35	1	.004	0.01
Race					1.01	4.02	1	.05	2.74 [1.02, 7.34]
NSSI Frequency					0.03	8.06	1	.01	1.03 [1.01, 1.05]
Self-Criticism					0.65	5.08	1	.02	1.91 [1.09, 3.35]
Model 2D3	18.06	3	<.001	.18					
Constant					-4.27	7.89	1	.01	0.01
Race					0.93	3.61	1	.06	2.54 [0.97, 6.66]
NSSI Versatility					0.29	5.74	1	.02	1.34 [1.05, 1.70]
Self-Criticism					0.59	4.63	1	.03	1.81 [1.05, 3.10]

Note. NSSI = nonsuicidal self-injury. R^2 refers to Cox & Snell R^2. B refers to the unstandardized coefficient. Race was dichotomized such that 0 = non-Hispanic/Latinx white participants, 1 = participants of all other racial/ethnic groups. NSSI recency was categorized with past week NSSI as the reference category, such that 1 = more than 12 months ago, 2 = 6-12 months ago, 3 = 3-6 months ago, 4 = 1-3 months ago, 5 = 1 week to 1 month ago.

Concurrent Associations between Depression, Self-Criticism, and Follow-up NSSI Urges

First, we tested separate cross-lagged models in which NSSI urges (now using the seven-point rating ordinal scale) and depressive symptoms or self-criticism were allowed to predict themselves and each other over time and at the same assessment wave. There were significant auto-regressive effects for NSSI urges, depressive symptoms, and self-criticism over time, such

that higher levels of urges and/or symptoms at a specific follow-up predicted higher levels of the same construct at the next follow-up. Consistent with hypothesis 3A, within-person elevations in depressive symptoms, relative to one's own estimated mean over follow-up, positively predicted NSSI urges at the same follow-up ($OR = 1.22$, $p < .001$); however, depressive symptoms did not predict NSSI urges at the following assessment ($OR = 0.99$, $p = .74$; see Figure 1).

Figure 1

Longitudinal Model of Depression and NSSI Urges
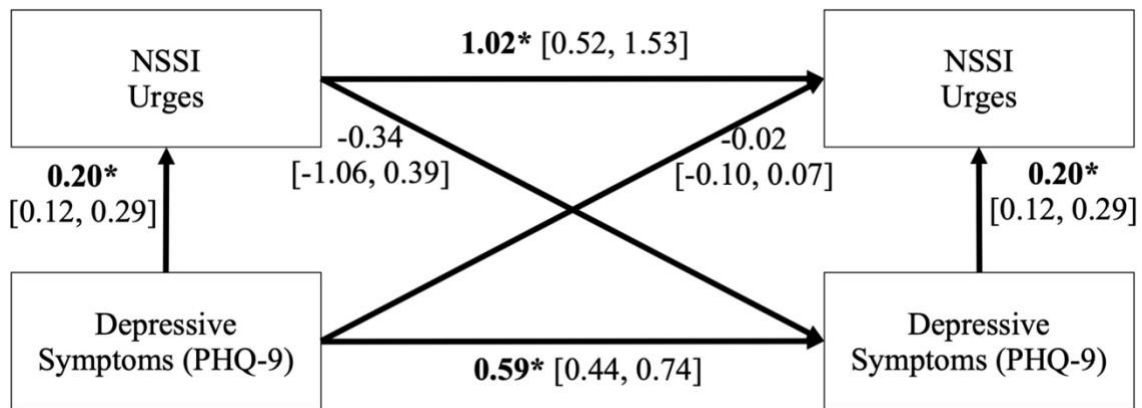
Note. NSSI = nonsuicidal self-injury. Parameters were set to equivalence across assessments; thus, the figure demonstrates results across any two adjacent follow-up periods (T2 to T3, T3 to T4). Unstandardized beta values (path coefficients) are followed by 95% confidence intervals. Coefficients that are bolded and followed by an asterisk were statistically significant at $p < .05$.

Contrary to hypothesis 3B, relatively higher self-criticism compared to one's own average level did not significantly predict NSSI urges at the same follow-up ($OR = 1.04$, $p = .82$). However, with respect to our exploratory aim examining lagged, prospective associations, self-criticism significantly predicted later NSSI urges, controlling for auto-regressive effects (*OR*

= 1.65, p = .01; see Figure 2). Although absolute model fit indices are not available for these

results, as the models are just-specified (saturated), Akaike information criterion (AIC) and

Bayesian information criterion (BIC) values were lower for the model of self-criticism and NSSI

urges (AIC = 1018.92, BIC = 1079.44) relative to the model of depression and NSSI urges (AIC

= 1807.15, BIC = 1867.67), indicating somewhat better model fit for the self-criticism model.

Figure 2

Longitudinal Model of Self-Criticism and NSSI Urges
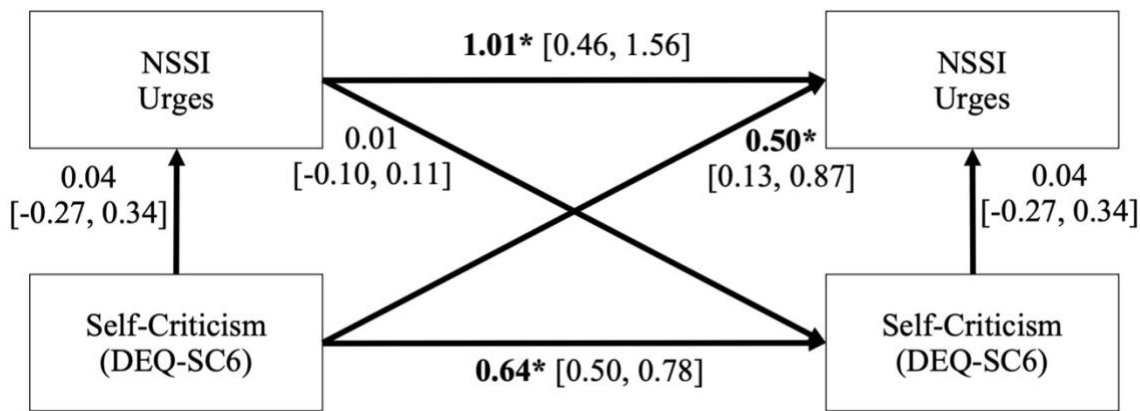
Note. NSSI = nonsuicidal self-injury. Parameters were set to equivalence across assessments;

thus, the figure demonstrates results across any two adjacent follow-up periods (T2 to T3, T3 to

T4). Unstandardized beta values (path coefficients) are followed by 95% confidence intervals.

Coefficients that are bolded and followed by an asterisk were statistically significant at p < .05.

Discussion

Theoretical models of NSSI emphasize the roles of negative affective experiences and

self-perception. These models highlight the important roles of depressive symptoms and self-

critical cognitions in understanding NSSI urges and behaviors (e.g., Hooley & Franklin, 2018;

Klonsky et al., 2015). However, prior research has been limited by cross-sectional designs that impede examination of the prospective, longitudinal associations of these phenomena in daily life. To address these gaps in the literature, we used longitudinal data from a sample of college students with elevated depressive symptoms and a lifetime history of NSSI to examine the concurrent and time-varying associations between depressive symptoms, self-criticism, and NSSI urges over six weeks.

First, we found that participants with greater numbers of NSSI methods and higher lifetime NSSI frequency at baseline had higher odds of NSSI urges over follow-up, consistent with research supporting both constructs as indicators of clinical severity (Turner et al., 2013; Victor & Klonsky, 2014). Interestingly, participants who had ceased NSSI between one week and one year ago did not differ from those with past-week NSSI in terms of follow-up NSSI urges, showing that NSSI urges tend to persist after NSSI behaviors cease (Lewis et al., 2019). This information suggests the need for additional and continued support for people who have not engaged in NSSI for less than one year but have a history of NSSI behaviors.

Although depressive symptoms at baseline predicted NSSI urges over the follow-up period, this effect was no longer significant after controlling for NSSI features. Further, in longitudinal path models, depressive symptoms were significantly associated with concurrently assessed NSSI urges, but not with NSSI urges at the next follow-up. Thus, although depression diagnosis and depressive symptoms are prospectively associated with NSSI (Fox et al., 2015), depressive symptoms may not be an effective longitudinal predictor of NSSI urges in young adults with elevated depressive symptoms who have already begun engaging in NSSI. Further research is warranted to determine whether these results replicate in other populations.

In contrast, self-criticism exhibited a robust association with NSSI urges over follow-up, even controlling for baseline NSSI characteristics. In longitudinal analyses, self-criticism did not relate to concurrent NSSI urges but did predict increased NSSI urges at later time points. These results suggest that self-criticism may be a particularly important process to address to ameliorate NSSI urges and behaviors among at-risk young adults. Unfortunately, self-criticism has been most frequently examined as trait-like or stable over time, resulting in relatively few studies examining within-person changes in self-criticism over time as they relate to NSSI or other important health behaviors using ecological momentary assessment (for exceptions to this pattern, see Burke et al., 2021b and Vansteelandt et al., 2020). Further research is needed examining how self-criticism may change over shorter intervals, such as minutes or hours, how these experiences relate to both NSSI urges and behaviors, and how different components of self-criticism may differentially relate to NSSI urges and behaviors, ideally using more exhaustive, multi-dimensional assessments of self-critical emotions and cognitions. This is particularly important given the variation in measures of self-criticism used in prior NSSI research (Zelkowitz & Cole, 2019), and the limitations of the DEQ-SC6 as a measure of self-criticism (Tibubos et al., 2023). Prior work suggests that momentary aversive self-awareness or low self-concept clarity may be associated with the desire for physical pain or NSSI among those at risk (Boccagno & Hooley, 2023; Scala et al., 2018), highlighting the need for testing varied conceptualizations of self-criticism and its correlates in daily life.

As with any study, our methodology has notable strengths and important limitations. The recruitment strategy was designed to be more representative of college students than a sample drawn from a traditional Psychology subject pool, and participants were screened based on elevated depressive symptoms, increasing the relevance of understanding NSSI in this

population. Completion rates for follow-up assessments were high, and the repeated measures over a six-week interval allowed for examining longitudinal predictors of changes in NSSI risk over time, which has been rare in prior work. Further, using validated, appropriate measures for each construct allows for stronger inferences based on our results. However, the sample was limited with respect to its age range (relative to the general population) and the demographics of the student body at the university where recruitment occurred; future research is needed to determine whether similar results would be found among other age groups, in young adults not enrolled in higher education, and in populations receiving more intensive psychiatric care, as well as in diverse racial and ethnic groups. For instance, we found that non-Hispanic/Latinx White participants were more likely to report NSSI urges over follow-up than other participants, but this result is difficult to interpret because of the need to combine individuals from a diverse range of ethnic and racial backgrounds into a single group due to small cell sizes. Similarly, because the study was limited to participants with elevated depressive symptoms, findings may not generalize to individuals engaging in NSSI with other (or no) elevated psychiatric symptoms. Further, the endorsement of NSSI behaviors over follow-up was quite low relative to the endorsement of NSSI urges; thus, more work is needed to elucidate whether depression and self-criticism contribute to the transition from NSSI urges to NSSI behaviors. Additionally, baseline assessment of NSSI history did not require participants to have engaged in NSSI causing destruction of bodily tissue (e.g., pulling hair), which may have impacted the overall severity of NSSI in the sample. However, 75% ($n = 69$) of participants reported a history of at least one NSSI method known to cause bodily tissue damage (cutting, burning, severe scratching, carving), suggesting not all NSSI reported in this study was of a low severity. Further, NSSI urges themselves were common over follow-up, reported by between 36% and 53% of

participants at each assessment; however, the vast majority of endorsed NSSI urges were characterized as occurring "rarely", highlighting the difficulty in assessing these experiences, which may happen only sporadically over a two-week interval. Future research may yield more variability in NSSI urges assessed over briefer periods, such as a few hours, using methodologies such as ecological momentary assessment, which would be less susceptible to recall bias and perhaps capture more fleeting NSSI urges. Also, although a PHQ-9 screening score of 10 or greater was required for entry into the study, baseline PHQ-9 scores were slightly lower and indicative of mild depressive symptoms ($M = 8.08$, $SD = 3.86$), perhaps due to regression to the mean or selection biases with respect to which interested individuals ultimately attended a baseline session. Despite this decline over time, study participants are representative of those with depressive disorders (Morris et al., 2023). Finally, the use of multiple statistical tests could have inflated our Type I error rate, such that results close to the $p < .05$ threshold could be statistical artifacts; however, we do not view this issue as likely to be driving our overall results, as findings were robust to the inclusion of relevant covariates and when controlling for auto-regressive effects over time.

Although the incidence of NSSI behaviors over the follow-up period was too low to model in these data, NSSI urges are clinically meaningful. Most individuals who engage in NSSI attempt to resist NSSI behaviors when they experience NSSI urges (Klonsky & Glenn, 2008), and NSSI urges are associated with increased impairment and decreased quality of life among people receiving treatment for NSSI (Washburn et al., 2010). Further, NSSI urges are associated with elevated suicidal ideation (Victor et al., 2015) and prospectively predict increased NSSI behaviors (Turner et al., 2019), making NSSI urges critical targets for both suicide and NSSI prevention and intervention efforts.

On an encouraging note, should additional research continue to support the utility of self-criticism in predicting NSSI urges and behaviors, interventions have already been developed that appear to show efficacy in reducing self-criticism. The development of these interventions for self-criticism is critical given that interventions targeting NSSI and other self-injurious behaviors (e.g., suicide attempts), have not improved in efficacy over the past 50 years *and* show consistently small effects (Fox et al., 2020). For example, a relatively brief intervention designed to increase self-worth has been shown to decrease pain tolerance and willingness to endure pain among people with a history of NSSI (Hooley & St. Germain, 2013), and brief self-compassion exercises appear effective at creating short-term decreases in self-criticism (Kirschner et al., 2019). Compassion-focused therapy has preliminary data to support its efficacy in several clinical settings, although it has not yet been studied as an intervention for NSSI (Leaviss & Uttley, 2015). Further, data on longer-term outcomes in self-criticism interventions are more mixed; in one study using an online daily diary intervention targeting self-criticism, effects were significant immediately post-treatment but not over a three-month follow-up, and there was no significant difference between treatment conditions in decreasing NSSI (Hooley et al., 2018). However, given that NSSI urges and behaviors typically occur over relatively brief intervals, it is possible that short-term, as-needed strategies to decrease self-criticism could be used to cope with NSSI urges and avoid NSSI behaviors among people with elevated self-criticism.

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