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Nonsuicidal self-injury in adolescence: Prospective rates and risk factors in a 2 ½ year longitudinal study

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Abstract

Little is known about which risk factors longitudinally predict non-suicidal self-injury (NSSI) during adolescence, a period when these self-injurious behaviors become alarmingly prevalent. We prospectively studied the rates, course, and longitudinal prediction of NSSI from early through middle adolescence with a community sample of 103 youth (ages 11–14) who were assessed for NSSI at baseline and 2 ½ years later (94% retention; final $N=97$). Multiple risk factors (temperament, cognitive and interpersonal vulnerabilities, stressors; youths' and mothers' depression) were examined as prospective predictors of NSSI over the 2½ year follow-up. Analyses showed that 18% of youth engaged in NSSI over the 2½-year follow-up; 14% for the first time. Distal risks (assessed at baseline) that differentiated youth who engaged in NSSI from those who did not included negative cognitive style and mothers' prior depression. Proximal factors (assessed 2 years after baseline) that differentiated NSSI from non-NSSI youth included stressors, depressive symptoms, poor relationship quality, excessive reassurance seeking, and mothers' onset of depression. Several of these factors predicted new engagement of NSSI over 2½ years.

Keywords

Nonsuicidal self-injury; Risk; Adolescence

1. Introduction

Nonsuicidal self-injury (NSSI) refers to the direct, deliberate destruction of body tissue without lethal intention (Nock, 2009). NSSI differs from suicidality or self-harm with suicidal intent as these behaviors involve an intention to end life, whereas NSSI explicitly lacks lethal intentions. NSSI rates among adolescents are alarmingly high (13–23% of community adolescents) (Klonsky and Muehlenkamp, 2007; Nock, 2009). NSSI predicts longitudinal trajectories of suicidality among adolescents (Prinstein et al., 2008). People who deliberately harm themselves have a 30-fold increased risk for completing suicide compared to those who do not self-harm (Cooper et al., 2007). Despite some understanding of NSSI among youth, substantial gaps and methodological limitations exist (Prinstein,

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2008). Little is known about the longitudinal course of NSSI (Jacobson and Gould, 2007). Moreover, there is a lack of prospective research studying multiple risk factors for NSSI among youth (for exceptions, see Yates et al., 2008; Chapman et al., 2009). Prospective designs are sorely needed to advance knowledge on incidence and changes in NSSI over time as well as prediction of new engagement in NSSI (Nock, 2009).

We aimed to ascertain rates and changes in NSSI across important points during adolescence and predict new NSSI occurrence. Multiple risk factors were examined given the complex, “overdetermined” nature of NSSI (Prinstein, 2008). The NSSI risk factors investigated in this study were based on an emerging conceptual model of NSSI (Nock, 2009). This theoretical model posits that various distal risk factors (i.e., stable trait risks occurring farther in time away from NSSI as outcome), such as high emotional and cognitive reactivity, and more proximal factors (i.e., those risks occurring closer in time to NSSI as outcome), including intrapersonal and interpersonal influences and stressors, may contribute to NSSI. Very little research has examined distal and proximal risk factors as potential predictors of new engagement in NSSI over time among youth. Given the lack of prior longitudinal research with risks to NSSI, the particular risks selected for this study were based on those factors generally articulated in Nock’s recent NSSI model and those risks that have been shown to associate with suicidality among youth. We reasoned that investigating risks identified from the youth suicidality literature was a reasonable starting point given moderate associations between NSSI and suicidality (Prinstein et al., 2008). Still, it is important to highlight that the risk factors for NSSI and suicidality are not necessarily the same (Prinstein, 2008), just as NSSI and suicidality as behaviors are not equivalent.

Thus, given the dearth of research explicating risks to NSSI in youth over time, a primary aim of this exploratory study is to begin to provide an initial empirical foundation from which future theory generation and empirical testing with larger samples and more sophisticated, multi-wave prospective designs can advance knowledge more specifically on NSSI. We hope that the initial empirical information on stability, new incidence, and risk factors that predict new occurrence of NSSI over time can inform a new generation of research so that this serious public health concern can be better understood, assessed, predicted, and possibly prevented.

We investigated various distal factors, including temperament and cognitive vulnerabilities (Hankin, 2008a), which are posited to be relatively stable trait predictors of later NSSI. No research has examined temperament or cognitive factors as prospective risks for NSSI in youth, although some research has linked these factors with youth suicidality. Negative emotionality (NEM) is associated with higher risk for suicidality among youth (Fergusson et al., 2000; Enns et al., 2003). Distal cognitive vulnerabilities included negative cognitive style (Abramson et al., 1989), dysfunctional attitudes (Beck, 1987), rumination (Nolen-Hoeksema, 1991), and hopelessness (Abramson et al., 1989). A negative cognitive style, which involves making pessimistic causal attributions about negative events and inferring negative consequences and self-implications from these events, has been shown to differentiate adolescent suicide attempters from a non-suicide control group of hospitalized adolescents (Spirito et al., 1991). Rumination, which involves repetitively focusing on the meaning and implications of negative mood, is associated with suicidality, although prospective research is lacking (Morrison and O’Connor, 2008). Dysfunctional attitudes are the cognitive products of rigid and perfectionistic negative schemas.

More proximal interpersonal vulnerabilities included excessive reassurance seeking (Starr and Davila, 2008), lack of supportive relationships, and negative interactions with friends and family. No research has examined prospective associations between these interpersonal

risks and NSSI in youth, although some work has investigated links with suicidality. Lack of support and the presence of negative interactions correlate with adolescent suicidality (King and Merchant, 2008). Lack of family cohesion and support predicted suicide attempts (McKeown et al., 1998). Low family support predicted suicide attempts in an 8-year follow-up (Lewinsohn et al., 2001). We also assessed proximal stressors, which prospectively predict suicidality (Fergusson et al., 2000).

Finally, past and prospective onsets of youths' and mothers' depression were examined as risks to NSSI. General psychopathology (e.g., depression) in youths' family was not associated with adolescent NSSI, although a parent-report questionnaire, not diagnostic interview, was used to assess family psychopathology (Deliberto and Nock, 2008). Parents' psychiatric history has been associated concurrently with youths' risk for suicidal ideation and attempts (King and Merchant, 2008). We explored whether mothers' clinical depression would predict youths' NSSI based on interactional models (Coyne, 1976), including contagion processes (Abela et al., 2006), and the likely reinforcing functions that NSSI might serve in the context of mothers' depression (Hilt et al., 2008).

In sum, a paucity of prospective research has investigated rates and course of NSSI over time as well as NSSI prediction. In this relatively small sample, exploratory study, we sought to provide initial empirical data on new incidence, stability, and prediction of NSSI over time. We report incidence of NSSI during early adolescence (ages 11–14 at baseline) and then 2 ½ years later during middle adolescence when rates of NSSI are expected to increase. Also, we examined prospective models to predict new engagement of NSSI over 2½ years.

2. Method

2.1. Participants and procedure

Participants were 103 adolescents (61% girls; $N = 63$) between the ages of 11 and 14 (M age = 12.63, $SD = 1.25$). They resided in and were recruited from the greater Chicago metropolitan area. Demographics were 49% Caucasian, 32% African-American, 5% Asian-American, 12% Hispanic, and 5% other. Mothers reported an average educational attainment of “some college or a 2-year degree” and yearly household income of \$30,000 to \$45,000. These demographic characteristics are similar to those of the general Chicagoland population from which these youth and mothers were recruited.

Multiple recruitment methods were used: flyers posted in community locations (27% of participants obtained through this method), advertisements placed in local newspapers (29%), and emails distributed through university list-serves (44%). The study was advertised and described as “research on adolescent development.” Interested participants called the laboratory. A brief screening was conducted with mothers to determine eligibility. Adolescents had to be between ages 11 and 14. They were excluded if the mother reported that her child had been diagnosed with a severe learning or psychiatric problem (e.g., autism, psychosis); no adolescent was excluded.

The mother and youth visited the laboratory at baseline. Mothers provided informed written consent; youth provided written assent. Trained and supervised graduate students and staff administered diagnostic interviews and questionnaires. The Institutional Review Board approved all procedures. Adolescents and mothers were reimbursed for participation at baseline (\$30) and follow-ups (\$10).

Every 6 months for the next 2 years, the mother and child were interviewed separately over the phone to ascertain whether the adolescents had onset of depressive disorder in that 6-

month interval. At 2 years, mother and youth were mailed home a packet of questionnaires to measure proximal psychosocial factors. Finally, youth were reassessed at the 2½-year follow-up for NSSI occurring since the baseline assessment. Of the 103 youth, 97 (94% retention) completed measures at the 2-year and 2½-year follow-ups. There was no significant difference on any measures between youth who participated at baseline but not at follow-ups.

All participants were given referral forms with various affordable psychological services and community mental health centers regardless of self-injurious behavior or depression level. Youth who disclosed imminent suicidality were encouraged to discuss this with the mother with the assistance of the clinical interviewer. All 10 youth who endorsed suicidality over the 2½ years agreed to this. No child attempted or committed suicide.

2.2. Measures

All measures used in this study have been previously used and psychometrically tested with youth samples.

2.2.1. Nonsuicidal self-injury was assessed with the Functional Assessment of Self-Mutilation (FASM; Lloyd et al., 1997)—The FASM contains a checklist of various NSSI behaviors, frequency and onset. We included mild (e.g., self-hitting) and severe (e.g., cutting, burning) as NSSI (Deliberto and Nock, 2008), and we required that youth report that the NSSI occurred more than once in order to be counted and included as NSSI for analyses. The FASM has strong psychometric properties, including good reliability and validity with youth samples (e.g., Lloyd-Richardson et al., 2007; Hilt et al., 2008). The FASM was given at baseline to assess NSSI in the past year (early adolescence). It was given again at the 2½-year follow-up. The FASM also contains questions ascertaining function of NSSI, yet these items were not included for this study. Interviewers asked the adolescents, but not mothers, about youths' NSSI in the intervening 2½ years since baseline. This enables an analysis of prospective prediction of NSSI, examination of continuity of NSSI and new occurrence over time. Internal consistencies were adequate: $\alpha = 0.70$ and 0.72 at baseline and follow-up, respectively.

2.2.2 Children's Depression Inventory (CDI; Kovacs, 1985)—The CDI is a self-report measure assessing youths' depressive symptoms using 27 items. Each item is rated on a scale from 0–2 with higher scores indicating greater levels of depression severity. The CDI has shown good reliability and validity in youth (Kovacs, 1985). Internal consistency was excellent: $\alpha = 0.91$. It was given at baseline and 2-year follow-up.

2.2.3 Adolescent Life Events Questionnaire (ALEQ; Hankin and Abramson, 2002)—The ALEQ is a self-report measure assessing a broad range of stressors that typically occur among adolescents, including problems with school, peers, and family. Youth were asked to indicate how often (Likert scale from never (0) to always (4)) negative events occurred in the past 3 months. Higher scores indicate more exposure to negative events. It was given at 2-year follow-up. The ALEQ has demonstrated good test-retest reliability and validity (Hankin, 2008b).

2.2.4. Adolescent Temperament—Adolescents completed the Dimensions of Temperament Scale-Revised (DOTS-R; Wills et al., 1998) at Time 1 to measure positive (PEM) and negative (NEM) emotionality. The NEM ($\alpha = 0.84$) and PEM subscales ($\alpha = 0.87$) show good reliability and validity (Wills et al., 1998).

2.2.5. The Reassurance Seeking Scale for Children (RSSC; Joiner and Metalsky, 1995)—The RSSC is a self-report that measures excessive reassurance seeking. Adolescents rated 4 statements on a 3-point scale. RSSC exhibits adequate reliability and good validity (Abela et al., 2005). The RSSC was given at 2-year follow-up. Internal consistency was adequate: α was 0.71.

2.2.6. Support and Negative Interactions—Adolescents completed the Network of Relationships Inventory (NRI; Furman, 1998) at 2-year follow-up to measure perceived levels of quality of relationships, both positive (support) and negative interactions, with family (mother, father, sibling) and peers (romantic partner, same-sex friend, and opposite sex-friend). The NRI has demonstrated reliability (α s > 0.80) and good validity (Furman, 1998).

2.2.7. Children's Response Style Questionnaire (CRSQ; Abela et al., 2002)—Youth completed the 13-item rumination subscale at Time 1. Scores range from 0–39. It has shown strong reliability and validity (Hankin, 2008a,c). Internal consistency was good: α = 0.81.

2.2.8. Adolescent Cognitive Style Questionnaire (ACSQ; Hankin and Abramson, 2002)—The ACSQ is a self-report measure of negative styles. The ACSQ presents the adolescent with negative hypothetical events. Youth make inferences about the cause (internal-external, stable-unstable, and global-specific attributions), consequences, and characteristics about the self, based on the hypothetical event. Each item dimension is rated from 1–7. Total scores range from 45 to 315. The ACSQ has demonstrated excellent reliability and good validity (Hankin, 2008a, b). It was given at Time 1. Internal consistency was strong: α = 0.92.

2.2.9. Children's Dysfunctional Attitudes Scale (CDAS; Abela and Sullivan, 2003)—The CDAS is a 20-item self-report questionnaire assessing dysfunctional attitudes. Total scores range from 0 to 60. The CDAS has demonstrated adequate reliability and good validity (Abela and Sullivan, 2003). It was given at Time 1. Internal consistency was adequate: α = 0.75.

2.2.10. Children's Hopelessness Scale (CHS; Kazdin et al., 1986)—Youth self-reported hopelessness at 2-year follow-up with 17 true or false items (range 0–17). The CHS has shown good reliability and validity (Kazdin et al., 1986). Internal consistency was good: α = 0.80.

2.2.11. Depression diagnoses—The Kiddie Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (KSADS-PL; Kaufman et al., 1996) was used to assess past and present *DSM-IV* diagnoses of major (MDD) or minor (mDD) depressive disorder among youth. Adolescents and mothers completed the KSADS interview separately, and best estimate procedures were used to arrive at final youth diagnosis. Interviews were completed in the laboratory for past and current depressive disorder at baseline and over the phone at regular 6-month intervals for onset of clinical depression over 2 years. In our sample, 7% of adolescents received a past diagnosis of depression, and 24% received a diagnosis of a depressive disorder over the 2-year follow-up. Only depression, not other psychiatric disorders (e.g., anxiety, substance use, or personality disorders), was assessed because the main purpose of the study was to examine prospective risk factors for onset of depression and NSSI during adolescence.

2.2.12. Structured Clinical Interview for DSM (SCID-I; First et al., 1995)—The SCID-I is a semi-structured clinical interview designed to arrive at current and lifetime *DSM-IV* diagnoses with adults. The mood module was used to diagnose current and past depressive disorders at baseline and onsets over the 2-year follow-up. In our sample, 45% of mothers received a past depression diagnosis, and 16.5% had an onset over the 2-year follow-up.

3. Results

3.1 Statistical methods

We used descriptive statistics (counts, frequencies) to examine percentage of youth engaging in NSSI at baseline and at 2 ½ year follow-up. Point biserial (for dichotomous variables) and Pearson (for continuous variables) correlations were used to study strength of associations among variables. Independent t-tests, for dimensional variables, and χ^2 analyses, for dichotomous variables, were conducted to examine which factors showed significant group differences (engagement in NSSI at 2 ½ year follow-up versus not). Finally, multivariate logistic regression was used to investigate which risk factors, from those identified in the univariate t-tests or χ^2 analyses, uniquely predicted engagement in new engagement of NSSI over time after controlling for overlap among these risk factors and relevant demographic control variables.

3.2 Frequencies and descriptive characteristics of NSSI at baseline and 2½-year follow-up

At baseline, eight (8%) youth reported that they had injured themselves without intention to die in the year before the initial assessment. Of these, half engaged in serious NSSI (e.g., cut skin), whereas the other half reported minor NSSI (e.g., hit self purposefully). Eighteen of the participants (18%) reported engaging in NSSI in the follow-up over 2½ years. Fourteen youth (14%) reported initiating NSSI for the first time during the 2½-year follow-up. Of the 18 who engaged in NSSI, 67% reported serious (e.g., burned skin) along with mild NSSI, whereas 33% reported only milder NSSI (e.g., picked wound). There was significant association between minor and serious NSSI ($r = 0.55, p < 0.01$). Finally, seven youth who engaged in NSSI also reported suicidality over the follow-up (39% of NSSI youth); five were adolescents who reported new engagement of NSSI.

There was moderate continuity of NSSI from the baseline to the 2½-year follow-up as four of the eight youth at baseline continued to report NSSI engagement across the follow-up (50%; $r = 0.36, p < 0.001$). All 4 youth who engaged NSSI at baseline also reported serious NSSI at follow-up. These four youth who engaged in NSSI at baseline reported their prior history of NSSI at the 2½ follow-up, suggesting little problem with retrospective recall, at least for these four adolescents.

Table 1 shows descriptive statistics, based on risk factors assessed at baseline and 2-year follow-up, and demographics for youth who did and did not engage in NSSI. For baseline risks, youth who engaged in NSSI during the 2½-year follow-up reported a more negative cognitive style and a trend toward less extraversion. Mothers' prior history of clinical depression and onset of depressive disorder over the 2-year follow-up both were associated significantly with youths' NSSI engagement. For risk factors assessed at the 2-year follow-up, more stressful life events, elevated depressive symptoms, less supportive relationships, more negative interactions in relationships, more excessive reassurance seeking, and more hopelessness significantly differentiated youth who engaged in NSSI from those who did not. Cohen's *D* indicates the effect size for these risk factors (small > 0.2, medium > 0.5, and large > 0.8).

3.3. What predicts whether youth will self-injure?

We then included all of the significant risk factors from the previous univariate analyses in a multivariate logistic regression model to predict whether youth engaged in new NSSI at the 2 ½ year follow-up. Distal predictors included parents' past depression and youths' negative cognitive style. Proximal predictors included stressors, depressive symptoms, social support, negative interactions, excessive reassurance seeking, hopelessness and parent's onset of depression. We removed the eight youth who had engaged in NSSI in the year before the baseline assessment so that prospective occurrence in NSSI across the 2½-year follow-up was predicted. We controlled for overlap among predictors so unique prediction of new NSSI was examined. We also included gender and ethnicity as predictors given that White youth and girls were non-significantly more likely to engage in NSSI.

Results are shown in Table 2. Baseline negative cognitive style, onset of maternal depressive episode over the 2 years, youths' depressive symptoms and lack of social support at 2 years predicted youth who engaged in new NSSI. Finally, this pattern of significant predictors was maintained after controlling for youth suicidality over the 2½-year follow-up.

4. Discussion

Despite burgeoning interest in NSSI and growing documentation of the alarmingly high prevalence rates during adolescence, remarkably little is known about the longitudinal course of NSSI when prospectively assessed at critical developmental periods during adolescence. In this relatively small, exploratory study, we found that 8% of youth, when they were early adolescents (ages 11–14 at baseline), reported NSSI in the past year, and the prevalence of self-injury increased to 18% over the 2½-year follow-up when these youth were assessed for NSSI during middle to late adolescence (ages 13–17). Most of the youth who reported engaging in NSSI across the 2½-year follow-up were new cases (14%). There was also moderate continuity of NSSI from baseline to the 2½-year follow-up as 50% of these youth continued to deliberately injure themselves. Before this study, there was surprisingly no information concerning the longitudinal course of NSSI, the degree of continuity in NSSI over time, or new onsets during adolescence (Prinstein, 2008). Thus, these findings provide new, albeit preliminary, descriptive information that can inform replications and extensions with larger samples followed prospectively over time.

The NSSI rates found in this study are consistent with past research. The prevalence of 8% among the early adolescents is very similar to the prevalence rate of 7% found in past research with early adolescents (Hilt et al., 2008). The 18% prevalence across the 2½-year follow-up is within the range of 12–23% NSSI reported among middle to older adolescents (Jacobson and Gould, 2007). Also, the average age of onset for engaging in NSSI was consistent with the modal age range previously reported (Jacobson and Gould, 2007). It is reassuring that the descriptive characteristics observed in this small longitudinal study match closely with the findings reported in the literature with other larger community-based samples of youth. These descriptive data enhance confidence in the prospective prediction of NSSI over time.

In addition, we examined which risk factors prospectively predict initiation of NSSI over 2½ years of adolescence when these behaviors become more prevalent. Various distal risks, assessed at baseline (30 months before NSSI was measured), including more introversion, negative cognitive style, and mothers' prior depressive disorder, differentiated youth who engaged in NSSI from those who did not. Also, more proximal risk factors, including stressors, depressive symptoms, poor relationship quality (lack of social support and negative interactions within close relationships), excessive reassurance seeking, hopelessness, and mothers' onset of depressive disorder during the 2-year interval, all

differentiated the NSSI group from non-NSSI. Given the likely overlap among these risk factors, we included them together in a multivariate model to examine unique prediction of risk factors for later NSSI. Negative cognitive style, onset of maternal depression, youths' recent depressive symptoms, and lack of support predicted prospective onset of NSSI. Finally, these factors prospectively predicted new NSSI engagement even after controlling for youth who reported suicidality over the 2 ½ year follow-up. These analyses suggest that these risk factors uniquely predict NSSI above and beyond shared risk with suicidality, which is moderately associated with NSSI.

These findings are consistent with evolving theoretical models of reasons why individuals engage in NSSI (Nock, 2009). Less positive emotionality differentiated youth who engaged in NSSI versus those who did not. This distal temperament factor is consistent with Linehan's (1993) emotional dysregulation model of suicidal behavior that posits that individuals at risk for suicidality have an inability to modulate emotions adaptively (e.g., up-regulate positive emotions). Self-injury may be one method to regulate one's emotions, especially after more proximal stressors (Nock, 2009). The other significant distal risk that emerged was a negative cognitive style. This finding is consistent with the hopelessness theory of suicidality (Cornette et al., 2000), which postulates that pessimistic individuals who experience stressors are likely to exhibit suicidality.

An interesting finding is the significant prospective association between mothers' clinical depression and youths' engagement in NSSI. It will be important for future research to replicate and understand this association. One possible explanation for this intriguing finding is the interpersonal contagion hypothesis. Past research has shown that as parents exhibit more depressive symptoms, their children are likely to report prospective increases in symptoms over time (Abela et al., 2006). It may be that as parents become depressed, youth exhibit increases in depressive symptoms, and then begin to intentionally harm themselves for functional reasons (Nock and Prinstein, 2004). Adolescents may have engaged in NSSI for social positive reinforcement, such as to get attention from depressed mothers (Hilt et al., 2008) who may have been more withdrawn from their children. Consistent with this, youth who engaged in NSSI reported less social support. It may be that depressed mothers are less able to provide support and high quality relationships to their children. Related, an interesting line of future research would include investigation of shame and guilt, both with mothers and the adolescents, in the context of maternal depression and youths' engagement of NSSI. Youth may be ashamed of or embarrassed by their mothers' depression or feel partially responsible for her depression, and adolescents may engage in NSSI for different functions (e.g., social positive or negative intrapersonal reinforcement). Future research can also examine the multiple functions of NSSI within different interpersonal contexts by more explicitly inquiring about the reasons that youth self-harm, for example, when peers withdraw support, parents exhibit significant depression, or there is substantial conflict in close relationships.

These findings need to be considered in light of various strengths and limitations. Strengths include the use of a community-based sample of youth, as opposed to a clinical sample with known biases (Goodman et al., 1997). The prospective longitudinal design included assessments of NSSI at baseline and then again at a 2 ½ year follow-up and measures of distal and proximal risk factors at non-overlapping time points so that prediction of later NSSI could more clearly be ascertained. By assessing multiple psychosocial risk factors, including temperament, cognitive, interpersonal, and affective risks, based on Nock's (2009) model and known associations with suicidality, this study provided preliminary evidence on both univariate factors that differentiate NSSI-youth from controls as well as those unique prospective risk factors for new NSSI engagement after controlling for known overlap among these risk factors. Finally, we interviewed youth for onset of clinical depression

every 6 months across the 2-year follow-up; this reduces recall biases and enhances the accuracy, reliability, and validity of the depression diagnoses.

However, there are several limitations to this initial, exploratory study that can be improved upon in future research. Clearly, these limitations in design and sample may have biased the results. First, youth self-reports were used to assess psychosocial risk factors and NSSI. Youth retrospectively reported on NSSI over a 2 ½ year follow-up, so there are likely concerns about the accuracy of their recall over this time frame. Although the majority of prior research with youth and adults similarly has individuals report on NSSI engagement over similar time frames (e.g., 1 year to lifetime), future research would clearly benefit from prospective, multi-wave assessment of NSSI with shorter follow-ups to reduce recall problems and improve accuracy. Second, the size of the sample was relatively small, and the findings are best considered as preliminary. The statistical power to detect significant effects and test potentially more complex models was constrained.

Third, despite the longitudinal design, most of the risk factors were assessed only once, so we could not examine if these were time-varying or fixed predictors of self-injury. We chose to assess distal risk factors at baseline to predict NSSI 2½ years later given theory and evidence that these traits (e.g., cognitive vulnerabilities and temperament) are relatively stable and enduring (Hankin, 2008a), whereas proximal risks were assessed more closely in time to NSSI at follow-up (i.e., 6 months before NSSI assessment) given the perspective that these influences (e.g., stressors, depressive symptoms) would be more dynamic and less stable. Related, our assessment of NSSI at the 2½-year follow-up did not indicate when the NSSI occurred in relation to assessment of the proximal risk factors measured 6 months earlier, so temporal precedence and whether the hypothesized risk factors were possible antecedent or consequence of NSSI could not be determined. Multi-wave longitudinal designs with repeated assessments of both NSSI and risk factors could more clearly tease apart these issues and clarify temporal precedence. The evidence from this exploratory study can inform design of future studies and suggest which risk factors to assess as potentially stable traits (e.g., negative cognitive style) and which as more proximal, dynamic factors (e.g., depressive symptoms, social support).

Last, we did not assess functions of NSSI or diagnose other psychiatric disorders apart from youth and maternal depression. One would expect particular functions to be associated with particular risk factors. For example, social functions would likely correlate with parental depression and youth interpersonal risks (e.g., excessive reassurance seeking, social support), whereas automatic functions would be expected to associate with other risks (e.g., negative cognitive style, depressive symptoms). Future research can follow-up this study's findings with a larger sample, repeated assessments of NSSI and risk factors over time, and use of other informants and methods to assess risk factors, NSSI and its functions. Likewise, future research would benefit from a broader, and more comprehensive interview assessment of other psychiatric disorders to predict NSSI.

Pending replication of these initial findings, results from this exploratory study have clinical implications for assessment and interventions for NSSI. Given the paucity of knowledge about prospective risk factors for NSSI, which clearly portends increased risk for suicidal trajectories (Cooper et al., 2007; Prinstein et al., 2008), this study adds to the knowledge base for risk factors that clinicians can assess. Regrettably little empirically based practice exists for treating NSSI among youth (Nock, 2009). The most promising treatments appear to involve a form of cognitive-behavioral therapy (CBT) with family involvement (MacGown, 2004). This is consistent with the prospective risks identified in this study, such as negative cognitive style, stressors, depressive symptoms, various interpersonal factors,

and parent's onset of clinical depression, all of which would be targets of CBT treatment with family involvement.

In summary, this exploratory prospective study of NSSI rates and risk factors reveals that NSSI becomes increasingly more prevalent as youth progress through adolescence, and various risk factors predict prospective NSSI initiation. Given the nascent state of understanding of the causes and course of NSSI, we hope that this study's findings can inform future, more rigorous and larger scale research so that NSSI, as a serious public health concern, can be better understood, assessed, predicted, and its personal and societal damage and burden reduced.

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Table 1

Baseline and 2-year characteristics of non-NSSI and NSSI groups.

	Non-NSSI	NSSI group	T/ χ^2	D
<u>Baseline predictors</u>				
Youth's past depressive disorder	7%	0%	1.06	0.21
Parent's past depressive disorder	39%	64%	3.04*	0.62
Depressive symptoms	9.54 (7.22)	13.35 (7.86)	1.65	0.33
Negative emotionality	23.12 (5.22)	24.77 (3.83)	1.02	0.20
Positive emotionality	40.69 (6.26)	36.75 (7.54)	-1.91 [†]	0.39
Negative cognitive style	115.41 (34.61)	141.02 (20.03)	2.37*	0.48
Dysfunctional attitudes	24.30 (6.43)	25.38 (5.88)	0.55	0.11
Rumination	12.83 (8.5)	16.58 (7.14)	1.42	0.29
Sex	62% girls	87% girls	1.72	0.34
Age of first NSSI	N/A	11.22 (3.08)		
Ethnicity: White	47%	62%	1.05	0.21
Black	31%	38%		
Hispanic	12%	0%		
Asian American	5%	0%		
Other	5%	0%		
<u>Predictors at 2-year follow-up</u>				
Stressors	82.34 (24.46)	105.58 (29.04)	3.05**	0.62
Depressive symptoms	5.73 (5.57)	15.7 (9.08)	5.21***	1.06
Social support	24.54 (4.79)	18.73 (4.09)	-3.58***	0.73
Negative interactions	4.1 (1.15)	5.2 (1.08)	2.77**	0.57
Excessive reassurance seeking	0.28 (.78)	1.27 (2.28)	2.59**	0.53
Hopelessness	9.01 (1.65)	9.92 (1.56)	2.85**	0.58
Youth's depression onset	24%	25%	-0.01	0.02
Parent's depression onset	11%	29%	3.24*	0.65
Sex	52% girls	72% girls	1.64	0.33
Age	N/A	14.54 (1.26)		
Ethnicity: White	50%	61%	1.07	.21
Black	30%	31%		
Hispanic	10%	9%		
Asian American	5%	0%		
Other	5%	0%		

Note: N=97.

[†] p<0.06;

* p<0.05;

** p<0.01;

 $p < 0.001$.

D = Cohen's D for effect size.

Table 2

Multivariate logistic regression predicting youth engagement of new NSSI at 2½-year follow-up.

	B	S.E.	Wald	OR
Negative cognitive style—baseline	0.03	0.01	4.74*	1.03
Mother depression over 2 years	1.25	0.73	3.02†	3.58
Youth depressive symptoms at 2 years	0.24	0.10	5.54*	1.34
Social support at 2 years	-0.47	0.22	4.64*	0.62

Note: $N=89$. The 8 youth who engaged in NSSI at baseline were removed from these prospective analyses predicting new NSSI engagement.

† $p<0.08$;

* $p<0.05$;

** $p<0.01$;

*** $p<0.001$.

95.5% correctly identified. Model $\chi^2(4) = 28.53, p < 0.001$. Model $R^2 = 0.78$