



Social context during non-suicidal self-injury indicates suicide risk

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ABSTRACT

The link between non-suicidal self-injury (NSSI) and suicide is complex. Previous research indicates that self-injurers endorsing automatic/intrapersonal functions (as opposed to social/interpersonal functions) for NSSI are more likely to have considered and attempted suicide. Subsequent research suggests that those endorsing automatic/intrapersonal functions are more likely to self-injure exclusively while alone. Based on these findings, we hypothesized that the social context during NSSI (i.e., the extent to which one self-injures alone versus around others) represents an easily measurable and theoretically meaningful marker for suicide risk among those who self-injure. Participants were 205 young adults who had performed one or more NSSI behaviors and completed several clinical measures. In general, self-injurers scored higher on measures of suicidality and suicide risk factors (i.e., depression, anxiety, borderline personality disorder symptomatology) than a non-injuring control sample ($n = 596$). In addition, self-injurers who engage in NSSI alone were more likely to report a history of suicide ideation, plans, and attempts compared to other self-injurers. Endorsement of automatic/intrapersonal functions only partially explained the relationship between the social context during NSSI and suicidality. Consistent with the study hypothesis, social context during NSSI appears to be a marker for suicide risk in individuals who engage in NSSI.

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1. Introduction

Non-suicidal self-injury (NSSI) is the deliberate, self-inflicted destruction of body tissue without suicidal intent for purposes not socially sanctioned. As many as 14 different types of NSSI have been identified but the most common forms include skin-cutting, burning, and scratching (Ross & Heath, 2002; Whitlock, Eckenrode, & Silverman, 2006). Rates of NSSI are estimated at 4% in the general adult population and 20% in adult patient populations (Briere & Gil, 1998; Klonsky, Oltmanns, & Turkheimer, 2003). However, rates of NSSI appear to be disproportionately high in adolescents and young adults (Ross & Heath, 2002; Whitlock et al., 2006): Approximately 8% of children ages 12–14 (Hilt, Nock, Lloyd-Richardson, & Prinstein, 2008), 14–15% of adolescents (Laye-Gindhu & Schonert-Reichl, 2005; Ross & Heath, 2002), and 14–17% of college students (Favazza, DeRosear, & Conterio, 1989; Whitlock et al., 2006) report having self-injured. In adolescent inpatient samples, rates of NSSI appear to be 80% or higher (Nock & Prinstein, 2004). NSSI has become a growing public health concern due to its strong association with a number of serious clinical variables, including depression, anxiety, borderline personality disorder, and suicidality (Andover, Pepper, Ryabchenko, Orrico, & Gibb, 2005; Hawton, Rodham, Evans, & Weatherall, 2002; Klonsky

et al., 2003). The elevated rates of NSSI in adolescents and young adults, in addition to the behavior's associations with negative mental health outcomes, have stimulated research on risk and protective factors, the behavior's functions, and methods for intervention (Klonsky, 2007; Klonsky & Glenn, 2008; Klonsky & Glenn, in press; Muehlenkamp, 2006; Nock & Prinstein, 2004, 2005).

While research has documented consistent associations between NSSI and certain clinical correlates (e.g., depression, anxiety, and BPD), a key issue to be resolved is the relationship between NSSI and suicidal behavior. By definition, NSSI differs from suicidal behavior in terms of motivation (individuals who engage in NSSI want to continue life while those who engage in suicide attempts want to end life), and research has also uncovered key differences in medical severity (NSSI less often requires medical attention and is more superficial in its tissue damage than attempted suicide) (Brown, Comtois, & Linehan, 2002; Favazza & Conterio, 1989; Muehlenkamp & Gutierrez, 2004). At the same time, NSSI is a documented risk factor for suicidal behavior; elevated rates of suicidal ideation and behavior are consistently reported among self-injuring populations (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Whitlock et al., 2006).

One hypothesis regarding the relationship between NSSI and suicide is that self-injurers habituate to hurting themselves over time, and thereby become more capable of carrying out suicide attempts (Joiner, 2002). Consistent with this theory, self-injurers with a longer history of NSSI and who engage in more NSSI

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methods are particularly likely to have attempted suicide (Nock et al., 2006). However, these NSSI variables (i.e., history and method) accounted for only a small portion of the variance in suicidal behavior. It would therefore be useful to identify other characteristics of NSSI that put self-injurers at increased risk for suicide.

Another possibility is that risk for suicide might vary based on the function of NSSI. At least two superordinate functions of NSSI are documented in the literature: (1) automatic/intrapersonal functions (e.g., affect regulation, self-punishment) and (2) social/interpersonal functions (e.g., interpersonal influence, peer-bonding) (Klonsky & Olino, 2008; Nock & Prinstein, 2004). Initial research suggests that different functions of NSSI may be associated with different levels of suicide risk. In one study, self-injurers endorsing automatic/intrapersonal functions of NSSI were more likely to have made a recent suicide attempt (Nock & Prinstein, 2005). A subsequent study used a latent class analysis to identify clinically distinct subgroups of self-injurers, and found a subgroup characterized by high suicidality, endorsement of automatic/intrapersonal functions, and a tendency to self-injure alone (Klonsky & Olino, 2008). Because reinforcement associated with automatic/intrapersonal functions is self-focused (e.g., relieving one's negative emotions, directing anger at oneself), it follows that individuals endorsing automatic/intrapersonal functions would most often self-injure alone. Indeed, Klonsky and Glenn (in press) found evidence that self-injurers endorsing automatic/intrapersonal functions more often self-injured while alone. However, no study has directly examined the relationship among automatic/intrapersonal functions, tendency to self-injure alone, and suicidality.

Based on findings by Nock and Prinstein (2005) and Klonsky and Olino (2008), we believe the tendency to self-injure alone (henceforth AL-NSSI) may be an easily measurable and theoretically meaningful marker for suicide risk among those who self-injure. Specifically, we hypothesize that those who self-injure exclusively while alone will report more suicidal thoughts and behaviors than those who occasionally or frequently self-injure with or around others. We further hypothesize that endorsement of automatic/intrapersonal functions will partially explain the relationship of AL-NSSI and suicidality given its association with both these variables.

2. Method

2.1. Participants and procedure

801 college students from lower-level psychology classes were screened for a history of 12 NSSI behaviors. Approximately twenty-six percent of the current sample endorsed lifetime non-suicidal self-injury, which is consistent with rates of NSSI found in previous research on college samples (between 17 and 35%; Gratz, 2001; Whitlock et al., 2006). Participants were 205 students (57% female) who endorsed having engaged in at least one form of NSSI. The mean age of the sample was 18.5 years ($SD = 1.2$) and the racial composition of the sample was 42% Caucasian, 39% Asian, 6% African American, 6% Hispanic, and 7% other ethnicity. All participants gave informed consent and completed a battery of self-report measures for course credit. Only participants endorsing NSSI completed portions of the ISAS (see below) assessing the functions and social context of NSSI. Additional details about participants and the procedure are described in Klonsky and Olino (2008).

2.2. Measure

Inventory of Statements About Self-Injury (ISAS). The ISAS measures the frequency and functions of NSSI. Recent research found

the ISAS to be a reliable and valid measure of NSSI frequency and functions in a large sample of young adults (Klonsky & Olino, 2008). The first section of the ISAS assesses the lifetime frequency of 12 different NSSI behaviors performed "intentionally (i.e., on purpose) and without suicidal intent" (i.e., banging/hitting self, biting, burning, carving, cutting, wound picking, needle-sticking, pinching, hair pulling, rubbing skin against rough surfaces, severe scratching, and swallowing chemicals). In addition, the questionnaire assesses descriptive features of NSSI including the age of onset, experience of physical pain, time from the urge to self-injure until the NSSI act, and the tendency to self-injure alone (i.e., AL-NSSI). AL-NSSI was assessed with the question: "When you self-harm, are you alone?" Participants selected among three response options: "YES" = always alone during NSSI, "Sometimes" = sometimes alone during NSSI, or "NO" = never alone during NSSI.

The second section of the ISAS measures the functions of non-suicidal self-injury. The ISAS assesses 13 functions of NSSI that have been proposed in the empirical and theoretical mental health literature (Klonsky, 2007). The 13 functions of NSSI fall into two superordinate factors: (1) intrapersonal functions (i.e., affect regulation, anti-dissociation, anti-suicide, marking distress, and self-punishment) and (2) interpersonal functions (i.e., autonomy, interpersonal boundaries, interpersonal influence, peer bonding, revenge, self-care, sensation seeking, and toughness).

Youth Risk Behaviors Survey (YRBS). Suicidality was assessed using suicide questions from the Centers for Disease Control and Prevention's 1999 Youth Risk Behavior Survey (YRBS; Kann, 2001). Research has confirmed the test-retest reliability of the YRBS in an ethnically diverse sample of adolescents (Brener et al., 2002). A single suicidality score was created from these questions such that '0' indicates no history of suicidality, '1' indicates a history of suicidal ideation, '2' indicates a history of suicidal plans, '3' indicates a history of one suicide attempt, and '4' indicates a history of multiple suicide attempts.

The McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD). Borderline personality disorder (BPD) was measured in this sample using the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD), a 10-item self-report measure of BPD features (Zanarini et al., 2003). When compared to a validated structured interview, sensitivity and specificity of the MSI-BPD were both above .90 in young adults (Zanarini et al., 2003).

Depression Anxiety Stress Scales (DASS-21). Depression and anxiety were assessed using the Depression Anxiety Stress Scale (DASS-21; Henry & Crawford, 2005). The DASS-21 is a shortened version of the original 42-item scale (Lovibond & Lovibond, 1995). Research has confirmed the construct validity of the DASS-21 in non-clinical samples (Henry & Crawford, 2005).

3. Results

3.1. History of NSSI

The most common NSSI behaviors in the sample were banging/hitting self (61% of the sample), pulling hair (47%), pinching (42%), and cutting (40%). 82% of participants used multiple methods of NSSI. The average age of onset of NSSI was 13 years old, and approximately 62% of the sample had self-injured within the past year.

3.2. Clinical variables

Means and standard deviations of all clinical variables (i.e., depression, anxiety, BPD symptomatology, and suicidality) for both the self-injuring sample ($n = 205$) and a non self-injuring control sample ($n = 596$) are presented in Table 1. The DASS depression

Table 1

Means and standard deviations of clinical variables for self-injurers and non self-injuring controls

Variable	Self-injurers		Controls	
	M	SD	M	SD
Depression	5.41	5.30	2.22	3.15
Anxiety	5.12	4.50	2.66	3.02
Borderline PD ^a	4.34	2.41	2.40	2.21
Lifetime Suicidality ^b	1.24	1.36	0.21	0.66
Ideation	47.8%		10.1%	
Plans	37.1%		6.4%	
Single attempt	8.8%		1.3%	
Multiple attempt	9.8%		0.9%	
Last 12 months Suicidality	0.41	0.90	0.06	0.33
Ideation	18%		2.2%	
Plans	13.7%		2.3%	
Single attempt	3.4%		0.2%	
Multiple attempt	1.5%		0.0%	

Note. Depression, Anxiety, Borderline PD, and Suicidality were all significantly higher in the self-injuring sample ($ps < 0.0001$).

^a The self-harm item of the MSI-BPD was not included in BPD scores to avoid confounding the relationship between BPD and NSSI.

^b Suicidality measures severity of suicide on a scale from 0 to 4 with 0 = no suicidal behavior; 1 = history of suicidal ideation; 2 = history of suicidal plans; 3 = history of a single suicide attempt; 4 = history of multiple suicide attempts.

and anxiety scales showed good internal consistency in both the self-injuring ($\alpha s = 0.88$ and 0.82 , respectively) and control samples ($\alpha s = 0.82$ and 0.74 , respectively). In addition, MSI-BPD demonstrated good internal consistency in the self-injuring and control samples ($\alpha s = 0.73$ and 0.74 , respectively). All clinical variables measured were significantly higher in the self-injuring sample (all $ps < 0.0001$). In particular, self-injurers were approximately eight times more likely to seriously consider suicide and were almost 25 times more likely to attempt suicide than the non-injurers.

3.3. The tendency to self-injure alone (AL-NSSI) and suicidality

Social context data was missing for seven participants; therefore, the analyses were conducted on the remaining 198 participants. In order to provide a sufficient sample size for the analyses, the “Never” alone during NSSI ($n = 23$) and “Sometimes” alone during NSSI ($n = 67$) participants were combined into one group. Therefore, the following analyses refer to the comparison of (1) participants in the “Always” alone during NSSI groups ($n = 108$) and (2) the combined “Sometimes” alone and “Never” alone during NSSI groups ($n = 90$). Consistent with our hypothesis, analyses indicate a robust relationship between AL-NSSI and suicidality [$t(196) = 4.29$, $p < 0.001$]. Specifically, self-injuring alone as opposed to around others was positively associated with suicidality. Because females were more likely to self-injure while alone [$\chi^2(1, 197) = 9.54$, $p < 0.005$], gender was examined as a covariate in the relationship between AL-NSSI and suicide, but the association remained significant (see Table 2). Ethnicity was not related to AL-NSSI [$\chi^2(2, 198) = .19$, $p = 0.91$] and thus not examined as a covariate.

Table 2Relationships of AL- NSSI^a to suicidality controlling for several clinical covariates

Covariates	df	F	p
Gender	1	13.16	0.000
Automatic/ intrapersonal Functions	1	8.55	0.004
Depression	1	14.51	0.000
BPD symptomatology	1	11.16	0.001
Frequency of cutting behavior	1	7.97	0.005
Frequency of carving behavior	1	14.68	0.000

^a “AL-NSSI” refers to whether participants self-injure (1) “Always” while alone versus (2) “Sometimes” or “Never” alone.

After finding evidence for a direct relationship between AL-NSSI and suicidality, we first examined the role of automatic/intrapersonal functions of NSSI in this association. As expected, AL-NSSI was strongly related to the automatic/intrapersonal functions of NSSI [$t(195) = 4.26$, $p < 0.001$]. An ANCOVA was conducted to test the hypothesis that this variable would account for the overall association between AL-NSSI and suicidality. After controlling for automatic/intrapersonal functions, although the strength of the association decreased, the relationship between AL-NSSI and suicide remained robust [$F(1, 197) = 8.55$, $p < 0.005$] (see Table 2).

Because automatic/intrapersonal functions only partially explained the relationship of AL-NSSI to suicide, we explored other variables that might account for the association. In particular, we were interested in suicide risk factors that might correlate with AL-NSSI and thus explain the relationship of AL-NSSI to suicidality. Several risk factors for suicide were measured in the present study, and we first determined which of those risk factors were also related to AL-NSSI. AL-NSSI was related to anxiety at a trend level, but this relationship did not reach significance [$t(196) = 1.91$, $p = 0.06$]. However, AL-NSSI was significantly related to depression [$t(196) = 2.03$, $p < 0.05$], BPD symptomatology [$t(196) = 3.12$, $p < .005$], the frequency of cutting behavior [$t(196) = 4.87$, $p < 0.001$], and the frequency of carving behavior [$t(196) = 2.70$, $p < 0.001$]. Therefore, we entered these variables into a series of ANCOVAs. In each case a unique and robust relationship between AL-NSSI and suicide remained after controlling for the variable. Full results are presented in Table 2.

To understand in greater detail the aspects of suicidality that relate to AL-NSSI, we used chi-square analyses to separately examine the relationship of AL-NSSI to suicidal ideation, plans, attempts, and multiple attempts. As indicated in Table 3, AL-NSSI was related to histories of suicide ideation, plans, and attempts ($ps \leq 0.01$). More specifically, higher rates of suicidal thoughts and behaviors were observed in the “Always” alone group compared to the “Sometimes” or “Never” alone groups. AL-NSSI was related to a history of multiple suicide attempts at a trend level ($p = 0.14$) (see Table 3). The non-significant p -value may be due to insufficient power in light of the small subsample of participants (20 of the 198) who engaged in multiple suicide attempts.

4. Discussion

Findings support our hypothesis that the tendency to self-injure exclusively while alone represents a theoretically meaningful and easily measurable indicator of suicide risk among those who engage in NSSI. Individuals who self-injure exclusively alone – that is, never with others or never in the presence of others – endorse substantially more suicidal thoughts and behaviors. Effects were strongest for suicidal ideation and plans, but were also significant for a history of suicide attempts.

Moreover, the relationship between AL-NSSI and suicidality remained significant even when accounting for previously documented indicators of suicide risk. For instance, automatic/intrapersonal functions of NSSI are a known correlate of both suicide risk and AL-NSSI (Nock & Prinstein, 2005). However, a significant relationship between AL-NSSI and suicidality remained even when controlling for endorsement of automatic/intrapersonal functions. The relationship between AL-NSSI and suicide risk also remained after controlling for gender, depression, BPD, and frequency of NSSI. Thus, AL-NSSI appears to be a particularly robust indicator of suicide risk among those who engage in NSSI.

Findings from this study have useful treatment implications. In treatment settings, patient safety is of chief importance and suicide

Table 3
Relationship of social context during NSSI to suicide ideation, plans, and attempts

History of lifetime...	"Sometimes" or "Never" alone during NSSI (n = 90)	"Always" alone during NSSI (n = 108)	Chi-square Test	
	n (%) ^a	n (%) ^b	χ^2	p
Suicidal ideation	27 (30.0)	69 (63.9)	22.57	0.00
Suicidal plans	20 (22.2)	55 (50.9)	17.19	0.00
Suicide attempts	10 (11.1)	27 (25)	6.23	0.01
Multiple attempts	6 (6.7)	14 (13.0)	2.14	0.14

^a Percentages out of 90 participants.

^b Percentages out of 108 participants.

risk is routinely assessed; however, assessing suicide risk is particularly difficult among self-injuring patients. Although NSSI is distinct from suicide attempts based on motivation and medical severity (Brown et al., 2002; Favazza & Conterio, 1989; Muehlenkamp & Gutierrez, 2004), NSSI appears similar to suicide attempts and is a known risk factor for suicide (Whitlock et al., 2006). AL-NSSI can be easily assessed by therapists, and the current study suggests that assessing the social context can provide important incremental information about suicide risk.

This study has several limitations. One limitation is the use of a college sample. Future studies should replicate findings in larger and more diverse samples, including samples drawn from clinical settings. In addition, features of NSSI and clinical variables were assessed using retrospective self-report measures. Future research might employ alternative methodologies, such as daily diary techniques that permit near real-time measurement of both the social context during NSSI and suicidal thoughts and behaviors. In addition, the present study used a single item rated on a three-point Likert scale to assess AL-NSSI; this item required participants to aggregate across many NSSI episodes in making a single rating. Future studies should more thoroughly assess AL-NSSI. For example, it would be useful to have participants rate the social context for different episodes of NSSI, as well as measure additional aspects of the social context such as where the NSSI takes place, the type of persons present at the time of injury (i.e., family, friends, strangers, or other self-injurers), and whether others are made aware that the NSSI is taking place, even if not physically present. The development of a standardized measure of social context during NSSI may be useful for both research and treatment purposes.

Finally, this study was not able to clarify the specific mechanisms by which AL-NSSI confers risk for suicide and whether AL-NSSI is a specific risk factor or a specific severity indicator. Because NSSI typically occurs as a response to intense, negative emotions (Klonsky, 2007, *in press*), one possibility is that AL-NSSI reflects an individual's style for coping with these strong, negative emotions. Those who self-injure around others may be inclined to seek support from others when emotionally distressed, and this support may act as a buffer against suicide risk. In contrast, those who self-injure alone may choose to avoid others when emotionally distressed, or may lack sources of social support on which to lean during difficult times. One of the earliest and most prominent theories of suicide suggest that weak social bonds and a lack of integration into one's social environment confer risk for suicide (Durkheim, 1966). Recent empirical research supports this theory—in a comprehensive review of psychological autopsy studies of suicide, Cavanagh, Carson, Sharpe, and Lawrie (2003) found that social isolation was approximately two times as common in cases of completed suicides as compared to controls. It is possible that self-injurers may experience social anxiety (i.e., the desire to belong stifled by fear of negative evaluation) or social anhedonia (i.e., a lack of interest in belonging), either of which could preclude them from seeking social support. Future research may examine whether the tendency to self-injure exclusively while alone indi-

cates an inability or reluctance to obtain social support, which in turn confers risk for suicide.

Ethical Statement

No part of this article has been published or submitted to any other journal. There are two authors on this manuscript; each one has studied the manuscript in the form submitted, agreed to be cited as a coauthor, and has accepted the order of the authorship. The study described in this manuscript was approved by the University's Institutional Review Board.

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