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Revealing the form and function of self-injurious thoughts and behaviors: A real-time ecological assessment study among adolescents and young adults

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Abstract

Self-injurious behaviors are among the leading causes of death worldwide. However, the basic nature of self-injurious thoughts and behaviors (SITBs) is not well-understood because prior studies have relied on long-term, retrospective, aggregate, self-report assessment methods. We used ecological momentary assessment methods to measure suicidal and non-suicidal SITBs as they naturally occur in real-time. Participants were 30 adolescents and young adults with a recent history of self-injury who completed signal- and event-contingent assessments on handheld computers over a 14-day period, resulting in the collection of data on 1262 thought and behavior episodes. Participants reported an average of 5.0 thoughts of nonsuicidal self-injury (NSSI) per week, most often of moderate intensity and short duration (1–30 minutes), and 1.6 episodes of NSSI per week. Suicidal thoughts occurred less frequently (1.1 per week), were of longer duration, and led to self-injurious behavior (i.e., suicide attempts) less often. Details are reported about the contexts in which SITBs most often occur (e.g., what participants were doing, who they were with, and what they were feeling before and after each episode). This study provides a first glimpse of how SITBs are experienced in everyday life and has significant implications for scientific and clinical work on self-injurious behaviors.

Self-injurious behaviors are among the leading causes of death and injury worldwide (Nock, Borges et al., 2008; WHO, 2008), and represent one of the most perplexing problems facing psychological scientists. Philosophers have speculated about the nature of suicidal self-injury for centuries (e.g., Kant, Camus, Rousseau, Satre, Hobbes, Locke, Hume)(see Minois, 1999), and over the past 50 years scientists have used systematic research methods to study self-injurious thoughts and behaviors (SITBs). SITBs include both suicidal behaviors (e.g.,

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suicidal thoughts, suicide attempts) as well as non-suicidal self-injury (NSSI), which refers to the direct, deliberate destruction of body tissue in the absence of lethal intent (Nock & Favazza, 2009; Nock, Wedig, Janis, & Deliberto, 2008). This research has provided valuable information about the prevalence, risk factors, and treatment of these distinct but related forms of SITBs (Hawton & van Heeringen, 2000; Nock, 2009b).

Despite recent advances in the assessment and treatment of SITBs (Brown et al., 2005; Linehan et al., 2006), some of the most fundamental aspects of these outcomes remain poorly understood, and as a result SITBs remain very difficult to predict and prevent (Joiner et al., 2005; Nock, Borges et al., 2008; Prinstein et al., 2008). Two aspects of the way SITBs have been studied have contributed to this state of affairs. First, researchers historically have favored a deductive approach in which general theories as to why people hurt themselves are generated and tested empirically, rather than using field observation and description to understand the form (i.e., topographical characteristics) and function of the phenomena of interest. This limitation is not specific to the study of SITBs, but is true of psychological science more generally. As cogently argued several decades ago by Nobel laureate Niko Tinbergen (1963): “in its haste to step into the twentieth century and to become a respectable science, Psychology skipped the preliminary descriptive stage that other natural sciences had gone through, and so was soon losing touch with the natural phenomena” (p. 411). This focus has remained over time, as recently noted by Kagan (2007): “psychologists begin their inquiries with a favored construct…and invent laboratory procedures that promise to reveal its referents rather than begin with a reliable phenomenon and explore its causes and properties. Most natural scientists begin with a puzzling, but robust, phenomenon that colleagues acknowledge as important…and probe its properties” (p. 372).

Second, psychological scientists have lacked the methods needed to measure SITBs as they naturally occur. SITBs appear to be transient phenomena that rarely occur during laboratory- or clinic-based assessments and so prior studies, including our own, have relied on the use of long-term, retrospective, aggregate self-report questions to measure SITBs (e.g., “How many times in your life have you thought about hurting yourself?”)(e.g., Nock, Holmberg, Photos, & Michel, 2007). The methodological limitations introduced by relying on such a strategy are well-known (Bradburn, Rips, & Shevell, 1987; Schacter, 1999).

As a result of these limitations, basic information about SITBs as they naturally occur is lacking. For instance, perhaps surprisingly, among those at risk for SITBs no data exist regarding the actual frequency, intensity, or duration of self-injurious thoughts. Additionally, although some of the distal risk factors for SITBs are well-known (e.g., female sex, depression, borderline personality disorder)(Jacobson & Gould, 2007; Nock, Borges et al., 2008), very little is known about the proximal triggers for self-injurious thoughts, about what factors predict the transition from self-injurious thoughts to self-injurious behaviors, or about *why* people engage in SITBs. Moreover, although most researchers and clinicians distinguish between self-injury that is suicidal versus non-suicidal in nature based on the reported intent of the behavior, empirical data are lacking regarding the extent to which these distinct forms of SITB differ in their expression. Evidence showing that these putatively different forms of SITBs differ in their frequency, severity, duration, and common precipitants would strengthen the case for distinguishing between them (i.e., rather than

lumping them into one category of “parasuicide” or “deliberate self-harm” as is sometimes done in the literature). The answers to these fundamental questions would significantly advance our understanding of SITBs and would open up many new directions for scientific and clinical work.

Recent advances in the development of ecological momentary assessment (EMA) methods have provided novel ways of measuring behaviors and psychological processes as they occur outside the laboratory or clinic (Shiffman, Stone, & Hufford, 2008). The use of computerized assessment methods have proven especially useful in obtaining information about sensitive topics (Tourangeau & Yan, 2007; Turner et al., 1998). These new methods are ideally suited to measure SITBs as they occur in real time. Although still relying on self-report, the strengths of these methods include reduction of recall biases, increased reliability due to repeated assessment, and enhanced ecological validity due to data collection in natural settings (Hufford, 2007).

The purpose of the current study was to examine the real-time occurrence of SITBs among adolescents and young adults using EMA methods. We focused on adolescents and young adults in this study because SITBs are especially prevalent during this developmental period. Recent surveillance data reveal that suicide is the third leading cause of death among adolescents and young adults, and each year approximately 19% engage in NSSI, 13% seriously consider suicide, and 6% attempt suicide (Centers for Disease Control and Prevention, 2008; Massachusetts Department of Education, 2006). We focused on SITBs among those with a recent history of NSSI because we were interested in this dangerous and perplexing clinical behavior in itself, and because adolescents who engage in NSSI are at significantly increased risk for suicidal thoughts and attempts (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Prinstein et al., 2008). The use of a sample at high risk for SITBs increases the odds of observing such events during the assessment period; however, it also introduces potential limitations in generalizing the results of this study to all people who experience SITBs. Hence our immediate goal is to characterize the real-time occurrence of SITBs among the clinically-relevant group believed to be at highest risk for these behaviors—who might be natural targets for future interventions.

With these objectives in mind, our study’s first goal was to examine the basic form of SITBs, including their frequency, intensity, and duration. Our second goal was to elucidate the contexts in which self-injurious thoughts are most likely to occur. We wanted to answer the descriptive questions—when thoughts of self-injury occur: what are people typically doing, who are they with, and what are they feeling. Our third goal was to test which proximal factors predict the transition from self-injurious thoughts to self-injurious behaviors. That is, among episodes of self-injurious thoughts, what factors predict the occurrence of self-injurious behavior. This is an important question both scientifically and clinically as most known risk factors for self-injurious behaviors (e.g., presence of mental disorders) are actually of limited use in determining if and when a person is going to transition from self-injurious thought to behavior (Nock, Borges et al., 2008). As such, we sought to test what topographical characteristics (e.g., greater intensity) and contextual features (e.g., specific affective states) of self-injurious thoughts predict engagement in self-injurious behavior. Because this is the first study to systematically examine the process

through which self-injurious thoughts might lead to self-injurious behaviors, we tested each topographical and contextual factor examined as potential predictors of this transition in order to generate hypotheses for future studies in this area.

Our fourth and final goal was to examine the self-reported functions served by self-injurious behaviors (i.e., what purpose might such behaviors serve in everyday life?). Research on the functions of NSSI using long-term, retrospective self-reporting has revealed that people report engaging in this behavior in the service of: (a) intrapersonal-negative reinforcement (e.g., to decrease/distract from negative thoughts/feelings), (b) intrapersonal-positive reinforcement (e.g., to generate feeling/sensation when experiencing numbness or anhedonia), (c) interpersonal-negative reinforcement (e.g., to escape from some undesirable social situation), or (d) interpersonal-positive reinforcement (e.g., to communicate with/seek help from others)(e.g., Nock, 2009a; Nock & Prinstein, 2004, 2005). Guided by this earlier work, we examined the extent to which adolescents and young adults endorsed each function for each episode of self-injurious behavior.

Method

Participants

Participants were 30 adolescents and young adults (12–19 years, M=17.3, SD=1.9) selected from a larger, cross-sectional community study of NSSI (N=94; described in Nock & Mendes, 2008) based on inclusion criteria of: (i) experiencing NSSI thoughts in the past two weeks, and (ii) having access to a computer. Logistic regression analyses indicated that participants included in the present longitudinal study did not differ from the parent sample on sex, race, age, history of the 20 DSM-IV diagnoses assessed, or mode of recruitment, but only differed based on having been more likely to have experienced NSSI thoughts in the past month (B=−.22, SE=.11, p=.048). The current sample was 86.7% female; 86.7% European American, 6.7% Hispanic, and 6.7% other race/ethnicities. Consistent with the characteristics of our sample, several large studies of NSSI among adolescents and young adults suggest that those who engage in NSSI are mostly female, European American, and meet criteria for a wide range of psychiatric disorders, such as those reported in Table 1 (Jacobson & Gould, 2007). However, other studies have reported equal rates across sexes and race/ethnicities and there currently are no nationally representative data available regarding the demographic and psychiatric characteristics of those who engage in NSSI (Jacobson & Gould, 2007). As such, this sample cannot be considered representative of all adolescents and young adults who engage in NSSI or other SITBs.

Procedures

Participants, and their parents for those <18 years, provided informed consent to participate and were trained in the use of the personal digital assistants (PDAs) during a brief laboratory session. Participation involved carrying the PDA for 14 days and responding to a systematic series of questions several times per day using a stylus interface. A 14-day assessment period was chosen in an attempt to balance collecting enough data to capture multiple episodes of SITBs for each participant with the fact that EMA compliance decreases substantially after 1–2 weeks of assessments (Broderick, Schwartz, Shiffman, Hufford, &

Stone, 2003). The PDAs were programmed to beep twice daily (at mid-day and end-of-day) signaling the participant to complete an entry (i.e., signal-contingent responding). In addition, participants were instructed to self-initiate an entry whenever they experienced a self-destructive thought or behavior (i.e., event-contingent responding). We examine later whether key findings are sensitive to event versus signal response elicitation. In several cases participants were not able to return to the lab immediately after the 14-day period (e.g., those who lived further distances from the lab) and so continued to make entries until they returned. Overall, participants made entries on an average of 17.2 days (*SD*=5.3). Participants were instructed to upload data to a secure server each evening, and data were checked each morning by research staff for the purpose of ongoing risk assessment and compliance monitoring. Participants were contacted via telephone for a risk assessment when responses suggested imminent risk of serious injury or if they failed to upload data for three consecutive days. They returned to the laboratory for a debriefing session after the data collection period and were paid $100 or were allowed to instead keep the PDA ($135 value) if their compliance with the twice-daily signal-contingent entries exceeded 80%.

Assessment

Self-injurious thoughts and behaviors—Participants' past history of SITBs was assessed using the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock et al., 2007), a structured interview that assesses the presence, frequency (number of episodes), and severity of a range of SITBs including NSSI, suicide ideation, and suicide attempts. The SITBI has been shown to have strong inter-rater reliability (average κ=.99), test-retest reliability across 6 months (average κ=.70), and convergent validity with respect to other measures of suicide ideation (average κ=.54) and suicide attempt (κ=.65)(Nock et al., 2007). The presence and frequency of participants' SITBs prior to EMA assessment according to the SITBI are presented in Table 1.

Psychiatric diagnoses—Participants' current psychiatric diagnoses were assessed during their baseline laboratory visit using the Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS-PL; Kaufman, Birmaher, Brent, Rao, & Ryan, 1997). This semi-structured diagnostic interview was administered by the first author and four graduate research assistants who were trained to reliability and supervised throughout the course of the study (average reliability κ=.93 across all diagnoses). Diagnostic characteristics of the sample are presented in Table 1.

Ecological momentary assessment—Participants responded to a brief (approximately 1–4 minutes) structured series of multiple-choice questions at each data-entry period about the form and functions of SITBs. Items were selected for inclusion in order to address each of the study goals. Response options (e.g., list of feelings that typically precede self-injury) were generated by drawing on prior studies using EMA methods, prior research on SITBs, and the clinical experience of the authors in working with self-injurious adolescents (see Online Supplement for a list of the specific items, response options, skip logic details, and information about hardware and software used). For both signal- and event-contingent entries, participants first were asked if they had experienced a thought of engaging in any self-destructive behavior (currently or since the last assessment), including: suicide attempt

[defined in a brief manual given to each participant as “harming yourself with the intention of dying”] or NSSI [“harming yourself without wanting to die”], as well as alcohol use, substance use, bingeing, purging, unsafe sex, impulsive spending, or any other self-destructive behavior (each coded no/yes). We asked about this range of behaviors to examine the extent to which different self-destructive behaviors may co-occur and show similarities in form and function. If any self-destructive thought was reported, participants were asked follow-up questions regarding the characteristics of the thought, including the intensity (“Rate how intense the urge was to do the self-injurious/self-destructive behavior” on a 5-point-scale from “not present” to “very severe”), duration (“Indicate how long you thought about doing the behavior you selected above” on a 6-point-scale from “<5 seconds” to “5-hrs to 1-day”), and the context in which it occurred (e.g., “who were you with?,” “what were you doing?”). Respondents could check multiple responses for most items (e.g., if they engaged in more than one behavior, if they were with more than one person at the time of their thought/behavior) and an “other” response was included to allow for the reporting of contextual factors that we did not query. If “other” was selected, participants were asked to specify in their own words what “other” signified. Participants who reported a self-destructive thought were then asked if they had engaged in that behavior. If so, they were asked follow-up multiple-choice questions regarding the intended function of the behavior (“Indicate why you did the behavior:” [a] “Rid of thought/feeling,” [b] “Feel something,” [c] “To communicate,” [d] “Escape task/people,” [e] “Other”)(Nock & Prinstein, 2004), the actual consequences experienced (e.g., “Indicate what you felt when you hurt yourself”), and the duration of the behavior. If not, they were asked what they did instead of engaging in the behavior (“Identify the activities you did instead of hurting yourself”). This was asked in order to obtain information about adolescents’ alternative coping behaviors that may be useful for guiding treatment development.

Data Analysis

Data were analyzed using two strategies. First, descriptive statistics were calculated to examine the frequency, intensity, duration, co-occurrence, antecedents, and consequences of SITBs. Second, generalized hierarchical linear modeling (HLM) was used to test which contextual features of self-injurious thoughts predicted NSSI thoughts that did (=1) vs. did not (=0) lead to NSSI behaviors (i.e., among episodes of self-injurious thoughts, what factors predict the occurrence of self-injurious behaviors?) while accounting for the nestedness of observations within days within individuals. M*plus* 5.1 software with full-information robust maximum likelihood estimation was used for these analyses; main findings were replicated in SAS, NLMIXED, and GLIMMIX.

Results

Preliminary Analyses

All participants completed the study and 83.3% were fully compliant in that they completed at least the 28 entries requested. There were 1227 entries (*M*=40.9 per person; *SD*=21.2; range=5–108) that described 1262 episodes of self-destructive thoughts and behaviors (i.e., some entries reported multiple thoughts/behaviors while others reported no thoughts/behaviors). Of all reported episodes, 344 were instances of NSSI thoughts, 104 were

episodes of NSSI behavior, 26 were suicidal thoughts, and none were actual suicide attempts. Subsequent analyses focus primarily on these 474 SITBs.

Participants who reported experiencing NSSI thoughts during the study period (93.3%) reported an average of 5.0 NSSI thoughts per week (*SD*=3.4). NSSI was performed by 86.7% of participants, who reported an average of 1.6 of NSSI episodes per week (*SD*=1.1). Participants who experienced suicidal thoughts during the study period (33.3%) had an average of 1.1 suicidal thoughts per week (*SD*=0.6).

HLM Model-Building Procedures

Before describing the results of our HLM analyses predicting when NSSI behaviors accompany NSSI thoughts, we first describe the procedures followed to construct these models.

Choice of appropriate nesting structure—In order to pick an appropriate nesting structure, we began with an unconditional model and compared a two-level random intercept only model (Model 1) versus a three-level random intercept only model (Model 2) (i.e., is there significant unexplained variability in level of NSSI behavior across observations-within-individual (*k*) [Model 1] or across days-within-individual *and* observations-within-day [Model 2]) Subscript *i* denotes observation; *j* denotes day; *k* denotes individual.

$$\begin{aligned}
&\text{Response distribution:} && nssi_{ik} \mid \mu_{ik} \sim BER(\mu_{ik}) \\
&\text{Link function:} && \eta_{ik} = \log\ \text{it}(\mu_{ik}) \\
&\text{Linear predictor:} && \\
&\text{level 1 (observation):} && \eta_{ik} = \beta_{0k} \\
&\text{level 2 (individual):} && \beta_{0k} = \gamma_{00} + u_{0k} \\
& && u_{0k} \sim N\left[(0), \left(\tau_{00}^{(2)}\right)\right]
\end{aligned}$$

Model 1:

$$\begin{aligned}
&\text{Response distribution:} && nssi_{ijk} \mid \mu_{ijk} \sim BER(\mu_{ijk}) \\
&\text{Link function:} && \eta_{ijk} = \log\ \text{it}(\mu_{ijk}) \\
&\text{Linear predictor:} && \\
&\text{level 1 (observation):} && \eta_{ijk} = \beta_{0jk} \\
&\text{level 2 (day):} && \beta_{0jk} = \beta_{00k} + u_{0jk} \\
&\text{level 3 (individual):} && \beta_{00k} = \gamma_{000} + u_{00k} \\
& && \begin{matrix} u_{0jk} \\ u_{00k} \end{matrix} \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \tau_{00}^{(2)} & \\ 0 & \tau_{00}^{(3)} \end{pmatrix}\right]
\end{aligned}$$

Model 2:

In Models 1 and 2, as well as all subsequent models, the response distribution for the binary outcome (hereafter labeled *nssi*) was Bernoulli, and a logit link was used to relate the predictors of *nssi* to the expected value of *nssi* (μ) in order to ensure model-predicted *nssi* could not fall outside the range of 0–1. In Model 1, the intercept coefficient is β_{0k}, with mean γ_{00} and variance $\tau_{00}^{(2)}$ of the individual-level deviations from the mean u_{0k}. In Model 2,

the intercept coefficient is β_{0jk}, with mean γ_{000}, and variance $\tau_{00}^{(2)}$ of the day-level deviations from the mean u_{0jk}, and variance $\tau_{00}^{(3)}$ of the individual-level deviations from the mean, u_{00k}. Predictors are reported on the logit scale. The residual variance (not shown) is fixed to $\pi/3$.

In Model 1, the mean intercept was significantly different than zero (γ_{00}=−2.602, SE=.187, p<.001) and the variance of the intercept across individuals was also significantly different than zero ($\tau_{00}^{(2)}=.69, \mathrm{SE}=.22, p=.002$). The proportion of between-individual to between- plus within-individual variance in *nssi* was $\mathrm{ICC}_{\mathrm{individual\_level}}$ =.40. In Model 2, the variance of the intercept across days $\tau_{00}^{(3)}$ could not be estimated, indicating that the $\mathrm{ICC}_{\mathrm{day\_level}}$ would be extremely small and can be ignored. Therefore, two levels (observations within individual) were found to be an adequate nesting structure.

Choice of appropriate functional form of change over time—When using HLM to analyze EMA data, recommended practice (West & Hepworth, 1991) is to: (i) check for *seriality* (e.g. autocorrelation, given that observations are so close together in time), while controlling for the fact that lags between observations are unequal in our study (Beal & Weiss, 2003), (ii) check for *cyclicity* (e.g. if behaviors were more likely on weekend than weekday), and (iii) check for *trend* (i.e., included a time-within-day predictor which we coded on a proportion of the day metric [0 to 1]). Hence, in Model 3 we kept the same response distribution and link function but added fixed level 1 slopes for lagged NSSI behavior (*nssilag*) and amount of time since last observation (*lag*) and an interaction of these terms (*lag*×*nssilag*)—to check for seriality.

$$
\begin{aligned}
&\text{level 1 (observation):} \quad \eta_{ik}=\beta_{0k}+\beta_{1k}nssilag_{ik}+\beta_{2k}lag_{ik}+\beta_{3k}nssilag_{ik}\times lag_{ik}\\
&\text{level 2 (individual):} \quad \beta_{0k}=\gamma_{00}+u_{0k}\\
&\qquad\qquad\qquad\qquad\quad \beta_{1k}=\gamma_{10}\\
&\qquad\qquad\qquad\qquad\quad \beta_{2k}=\gamma_{20}\\
&\qquad\qquad\qquad\qquad\quad \beta_{3k}=\gamma_{30}\\
&\qquad\qquad\qquad\qquad\quad u_{0k}\sim N\left[(0),\left(\tau_{00}^{(2)}\right)\right]
\end{aligned}
\qquad \text{Model 3:}
$$

All were nonsignificant: level 1 slope of *nssilag* (γ_{10}=−.74, SE=.68, p=.275), level 1 slope of *lag* (γ_{20}=.42, SE=.26, p=.112), level 1 slope of *nssilag*×*lag* (γ_{30}=.03, SE=1.07, p=.381). We did graphical plots of model-implied *nssi* to check for cyclicity; none was found. In Model 4 we added *time-within-day* as a predictor, allowing the trend effect to have a fixed component as well as across-individual variability.

$$\begin{aligned}
&\text{level 1 (observation):} \quad \eta_{ik}=\beta_{0k}+\beta_{1k}nssilag_{ik}+\beta_{2k}lag_{ik}+\beta_{3k}nssilag\times lag_{ik}+\beta_{4k}timewithinday_{ik}\\
&\text{level 2 (individual):} \quad \beta_{0k}=\gamma_{00}+u_{0k}\\
&\qquad\qquad\qquad\quad \beta_{1k}=\gamma_{10}\\
&\qquad\qquad\qquad\quad \beta_{2k}=\gamma_{20}\\
&\qquad\qquad\qquad\quad \beta_{3k}=\gamma_{30}\\
&\qquad\qquad\qquad\quad \beta_{4k}=\gamma_{40}+u_{1k}\\
&\qquad\qquad\qquad\quad \begin{matrix}u_{0k}\\u_{1k}\end{matrix}\sim N\left[\begin{pmatrix}0\\0\end{pmatrix},\begin{pmatrix}\tau^{(2)}_{00} & \\ \tau^{(2)}_{10} & \tau^{(2)}_{11}\end{pmatrix}\right]
\end{aligned}$$

Model 4:

Mean slope of *time-within-day* (γ_{40}=.70, SE=2.42, p=.772), individual-variability in the slope of *time-within-day* ($\tau^{(2)}_{11}=2.76, \mathrm{SE}=19.35, p=.887$), and covariance of individual intercepts and *time-within-day* slopes ($\tau^{(2)}_{10}=-.20, \mathrm{SE}=13.61, p=.884$) were all nonsignificant. Hence, a random intercept only model was found to be an adequate functional form for these data.

Evaluation of conditional models—In the next phase of model-building, level 1 and level 2 predictors were added to the unconditional model with our chosen nesting structure and functional form of change over time (i.e. to the two-level random intercept only model). The effects of 43 level 1 predictors of NSSI behavior and two level 2 predictors of NSSI behavior (age, gender) were of interest, but could not all be included simultaneously. Therefore six separate conditional models were estimated (Models 5–10), each containing a separate subset of level 1 predictors. To minimize risk of omitted variable bias, subsets of predictors were chosen that were theoretically related and that had the same question stem, such that they were expected to be more correlated within-subset than across-subset. Although this approach did not entail any stepwise procedures involving pruning nonsignificant predictors, it should nonetheless still be viewed as exploratory, particularly given that no adjustments were made to control type I error. None of the level 1 predictors were hypothesized to have random slopes; fixed slopes were estimated for each. Since the equations for Models 5–10 were very similar, only differing in the particular set of level 1 predictors included, only one equation (Model 6) is provided here.

$$\text{level 1 (observation):}\quad \eta_{ik}=\beta_{0k}+\beta_{1k}drugtht_{ik}+\beta_{2k}alctht_{ik}+\beta_{3k}bingetht_{ik}+\beta_{4k}purgetht_{ik}+\beta_{5k}sexth t_{ik}+\beta_{6k}spendtht_{ik}+\beta_{7k}suictht_{ik}$$

$$\text{level 2 (individual):}\quad \beta_{0k}=\gamma_{00}+\gamma_{01}age_k+\gamma_{02}sex_k+u_{0k}$$

$$\beta_{1k}=\gamma_{10}$$
$$\beta_{2k}=\gamma_{20}$$
$$\beta_{3k}=\gamma_{30}$$
$$\beta_{4k}=\gamma_{40}$$
$$\beta_{5k}=\gamma_{50}$$
$$\beta_{6k}=\gamma_{60}$$
$$\beta_{7k}=\gamma_{70}$$
$$u_{0k}\sim N\left[(0),\left(\tau_{00}^{(2)}\right)\right]$$

Model 6.

In subsequent sections, the results from these final HLM Models 5–10 are described following basic descriptive statistics about each set of predictors. Tables 3–5 present both descriptive statistics and HLM results for a given set of predictors, and Tables 2 and 6 present additional descriptive analyses.

Form of SITBs

Intensity and duration of self-injurious thoughts—Descriptive analyses indicated that NSSI thoughts most often were of moderate-to-severe intensity, while suicidal thoughts typically were mild-to-moderate when present (Table 2). The duration of NSSI thoughts was normally distributed, while suicidal thoughts tended to be longer in duration (Table 2). HLM analyses for Model 5 revealed that when NSSI thoughts were present, the occurrence of NSSI behavior was predicted by greater thought intensity (γ=2.06, *se*(γ)=.39, p<.0001; odds ratio=7.85). In other words, there was a 7.85-fold increase in the odds of NSSI with each one-unit increase in thought intensity on the 0–4 scale shown in Table 2. The occurrence of NSSI behavior also was associated with a shorter duration of NSSI thoughts (γ= −.68, *se*(γ)=.22, p<.01, OR=0.51). Sex and age did not emerge as significant predictors in these analyses.

Overlap of Self-Destructive Thoughts

We examined the proportion of the time that thoughts of NSSI and suicide were accompanied by simultaneous thoughts of engaging in other forms of self-destructive behaviors. The rate of overlap with these other thoughts is presented in Table 3. These descriptive analyses showed that thoughts of both suicide and NSSI co-occurred with thoughts of alcohol and drug use 13.5%–34.6% of the time. Interestingly, NSSI thoughts were accompanied by thoughts of suicide only 1.0%–4.2% of the time, highlighting the distinction between these two behaviors. Suicidal thoughts were accompanied by NSSI thoughts 42.3% of the time, which is likely a function of both the greater frequency of NSSI thoughts and of the nature of the sample selected for this study (i.e., adolescents with a recent history of NSSI). HLM analyses (Table 3, Model 6) revealed no significant effects of these co-occurring self-destructive thoughts on the propensity for NSSI behaviors.

Contextual Features

Descriptive analyses indicated that when thoughts of both suicide and NSSI began, adolescents were most often socializing, resting, or listening to music (Table 4). They were using drugs or alcohol during only 0.0%–4.8% of episodes of self-injurious thoughts. Thus, although prior research suggests that suicide and NSSI are more prevalent among those with alcohol and substance use disorders, the vast majority of episodes of self-injurious thoughts occur while adolescents are sober. HLM analyses (Table 4, Model 7) revealed no significant effects for any of these activities as predictors of the propensity for NSSI behaviors. Further descriptive analyses indicated that adolescents most often were alone when they experienced the onset of self-injurious thoughts (Table 4). They also experienced such thoughts while with peers and friends a substantial portion of the time, and less often when with family or strangers. HLM analyses (Table 4, Model 8) revealed that among episodes of NSSI thoughts, being alone was a significant predictor of engagement in NSSI.

Additional descriptive analyses indicated that thoughts of NSSI were preceded most often by worry, followed by having a bad memory or feeling pressure (Table 5). These same precipitants were reported by adolescents as the most common triggers for thoughts of suicide, along with having an argument with someone. Adolescents reported having thoughts of suicide or NSSI after being encouraged by others to engage in the behaviors 1.7%–3.8% of the time. This was the least often endorsed precipitant, but one that raises some concern. HLM analyses revealed that none of these factors predicted propensity for NSSI behaviors in the context of NSSI thoughts (Table 5, Model 9).

Descriptive analyses indicated that NSSI thoughts occurred most often in the context of feeling sad/worthless, overwhelmed, or scared/anxious (Table 5). Interestingly, however, HLM analyses indicated that feeling scared/anxious or overwhelmed did not predict the occurrence of NSSI behavior. Instead, the odds of engaging in NSSI were significantly increased in the presence of feeling rejected, anger toward oneself, self-hatred, numb/nothing, and anger towards another, but decreased in the presence of feeling sad/worthless (Table 5, Model 10). Additional descriptive analyses indicated that suicidal thoughts occurred in the context of a wide range of negative affective states. Overall, there was general consistency in the order in which negative affective states were endorsed for both thoughts of NSSI and suicide; however, the rate of endorsement was consistently higher for suicidal thoughts, suggesting that such thoughts are preceded by more negative affect.

Function of NSSI

In the 104 episodes of NSSI recorded, participants were asked about why they had just engaged in NSSI. Descriptive analyses showed that adolescents reported most often engaging in NSSI for the purposes of intrapersonal-negative reinforcement (64.7% of episodes), followed by intrapersonal-positive (24.5%), and much less often for the purposes of interpersonal-negative (14.7%) and interpersonal-positive (3.9%) reinforcement. In order to better understand what affective or cognitive state adolescents were attempting to escape via intrapersonal negative reinforcement, we asked a follow-up question about this whenever that function was endorsed. Interestingly, adolescents reported not only attempting to use NSSI to escape from aversive affective states such as anxiety (34.8% of episodes), sadness

(24.2%), and anger (19.7%), but also from aversive cognitive states, such as a bad thought (28.8%) or bad memory (13.6%).

Alternative Behaviors

When adolescents had a thought of NSSI but did not engage in this behavior, they recorded what behavior they performed instead. The descriptive statistics in Table 6 show that instead of engaging in NSSI when they had a thought to do so, adolescents most often reported trying to change their thoughts (22.3% of the time), talking to someone, or engaging in a range of potentially distracting behaviors such as going out, doing homework, or using the computer. Similarly, following suicidal thoughts, instead of making a suicide attempt adolescents most often talked to someone, tried to change their thoughts, or did work/homework.

Sensitivity Analyses

In this study, individuals completed assessments that were both signal-contingent and event-contingent. This means that there is a potential dependency between the mechanism by which responses were solicited (selection mechanism) and the psychological mechanism that generates the clinical outcome (outcome-generating mechanism), and this dependency could result in selection bias for HLM parameters of interest (e.g., level 1 fixed slopes). To investigate this possibility, we expanded HLM Models 5–10 into *shared parameter models* (e.g., Follmann & Wu, 1995). That is, we (i) specified a selection model and (ii) tested whether the selection model was independent from each of the outcome Models 5–10. Specifically, for (i) our selection model stipulated that persons would be more likely to self-initiate a response when they were more sad, less numb, more rejected, and not with peers, controlling for age and sex. For (ii) we allowed a dependency between the selection model and each outcome Model 5–10 by permitting the random effect for the selection model to covary with the random effect for that particular outcome model (labeled $\tau^{o,s}$, below). In so doing, we account for a "non-ignorable" or "not missing at random" selection process in which individuals farther from the grand mean on NSSI behavior are allowed to have a higher probability of selecting into the sample. As an example, the shared parameter version of Model 6 is shown below; outcome model parameters are denoted with *o* superscripts and selection model parameters are denoted with *s* superscripts.

Outcome submodel (predicting nssi behavior):

$$\text{reduced form: } \eta^{o}_{ik}=\gamma^{o}_{00}+\gamma^{o}_{10}drugtht_{ik}+\gamma^{o}_{20}alctht_{ik}+\gamma^{o}_{30}bingeth t_{ik}+\gamma^{o}_{40}purgeth t_{ik}+\gamma^{o}_{50}sexth t_{ik}+\gamma^{o}_{60}spendth t_{ik}+\gamma^{o}_{70}suicth t_{ik}+$$

Selection submodel (predicting self-initiated vs. signal-initiated response):

$$\text{reduced form: } \eta^{s}_{ik}=\gamma^{s}_{00}+\gamma^{s}_{10}reject_{ik}+\gamma^{s}_{20}sad_{ik}+\gamma^{s}_{30}numb_{ik}+\gamma^{s}_{40}withpeer_{ik}+\gamma^{s}_{01}age_{k}+\gamma^{s}_{02}sex_{k}+u^{s}_{0k}$$

$$\begin{matrix} u^{o}_{0k} \\ u^{s}_{0k} \end{matrix} \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \tau^{o} & \\ \tau^{o,s} & \tau^{s} \end{pmatrix}\right]$$

Results of fitting shared-parameter versions of each Models 5–10 indicated that our hypotheses about the selection mechanism were partially supported: individuals were more likely to self-initiate a response when they perceived greater rejection ($p<.01$) and were not with peers ($p<.05$), controlling for sadness, numbness, age, and sex. However, there was fortunately not statistically significant dependency between the selection mechanism and outcome-generating mechanism: individual deviations in self-selected responding were *not* significantly related to individual deviations in NSSI behaviors (i.e. $\tau^{o,s}$ always $p>.05$). Consequently, the same overall pattern of significant and nonsignificant fixed effects and variance components emerged in the shared parameter models as did in the original HLM Models 5–10—except for binge thoughts, which significantly predicted NSSI only in a shared parameter model (est.=.92, SE=.46, $p<.05$). This sensitivity analysis provides evidence that our results are robust to effects of this non-random selection of responses, assuming we properly specified our selection model and outcome models.

Discussion

Information about the fundamental characteristics of SITBs is vital to the understanding and scientific study of these dangerous behavior problems; however, such information has escaped empirical study due to the transient nature of these phenomena. This study used recent innovations in EMA methods to examine SITBs as they occur in everyday life. Several specific findings from this study warrant further elaboration.

At the most basic level, this study demonstrates the feasibility of using EMA methods with people experiencing SITBs. Prior studies have used diary methods to measure the daily experiences of healthy adults (e.g., Hankin, Fraley, & Abela, 2005) and people who engage in common health risk behaviors such as cigarette smoking (e.g., Shiffman & Paty, 2006). This study extends recent research on the use of EMA methods to better understand more sensitive and clinically severe behaviors (e.g., Trull et al., 2008).

This study also provides previously unavailable information about how SITBs are experienced in real-time. The self-injurers included in this study reported approximately one thought of NSSI per day, most often of moderate intensity and short duration (1–30 minutes) and two episodes of NSSI per week. Compared to NSSI thoughts, suicidal thoughts occurred less frequently, were of longer duration, and led to self-injurious behavior (i.e., suicide attempts) less often. Interestingly, thoughts of NSSI rarely were accompanied by suicidal thoughts—highlighting the distinction between these different forms of SITB—but co-occurred with thoughts of alcohol/drug use and bingeing/purging approximately 15–20% of the time. This suggests that people who engage in multiple clinical behaviors (i.e., comorbidity) may simultaneously consider engaging in different pathological behaviors before selecting one within a given episode. This provides new insight into the nature of comorbid psychopathology. Notably, although participants thought of using alcohol/drugs during approximately 15–20% of their self-injurious thoughts, they reported actually doing so during approximately 3–5% of NSSI thoughts, suggesting NSSI occurs primarily while sober. However, these may be slight underestimates, as it is possible that participants were less likely to complete PDA entries while using alcohol/drugs.

Understanding what factors predict the transition from self-injurious thoughts to self-injurious behaviors has been one of the most challenging aspects of scientific and clinical work on SITBs. The EMA methods used in this study provided a unique opportunity to closely examine factors that might predict instances in which self-injurious thoughts lead to self-injurious behaviors. Results revealed that the occurrence of NSSI is predicted by a greater intensity and shorter duration of NSSI thoughts. This latter finding may reflect the cessation of NSSI thoughts following engagement in the behavior. Prior research suggests that a tendency to ruminate about negative events is associated with increased risk of engaging in SITB (Selby, Anestis, & Joiner, 2007), and that people may use self-injurious behavior as an effective means of distracting oneself from aversive rumination (Najmi, Wegner, & Nock, 2007). Our findings complement this earlier work and add to a growing literature suggesting that self-injury represents an effective method of ceasing rumination about negative events or self-injury itself.

One concerning finding was that in some cases, other people are encouraging youth to engage in NSSI. Particularly troublesome is that although this occurred in only a small number of instances, it was associated with nearly a doubling of the odds of engaging in NSSI (albeit not statistically significant). This finding is consistent with prior reports of the social contagion that can occur with NSSI (Prinstein, Guerry, Browne, & Rancourt, 2009), and suggests that in some instances peer influence can be explicit in nature. Future research is needed to further illuminate the mechanisms through which the behavior of one's peers can influence the increase, as well as decrease, of NSSI and other health risk behaviors.

Regarding the affective states that preceded NSSI, it is interesting to note that although feelings such as numbness and rejection were present during only a minority of NSSI thoughts, their presence was associated with significantly greater odds of NSSI behavior. Gaining a better understanding of why some specific affective states (e.g., anger, self-hatred, rejection) predict engagement in NSSI represents a very important direction for future research. It may be that these states are characterized by higher arousal and that this elevated arousal is what increases the odds of engaging in NSSI (Nock & Mendes, 2008). The negative association between sadness and NSSI was surprising. Prior studies suggesting that negative/depressive affective states are associated with avoidance motivation, whereas states such as anger are associated with approach motivation, may help to explain this pattern of findings (Carver & Harmon-Jones, 2009). However, this interpretation is speculative and the picture is likely much more complex (Watson, 2009). Future studies must carefully and more objectively assess real-time affective experiences before, during, and after SITBs in order to better understand how such states might influence the occurrence of such outcomes. Notably, we were unable to study the transition from suicidal thoughts to attempts given the lack of suicide attempts during the study period and this remains an important research direction.

Our findings on the reported functions of NSSI are consistent with the retrospectively reported functions of this behavior (Klonsky, 2007) and extend earlier research in two important ways. First, our examination of individual episodes of NSSI provided a measure of the relative frequency of each function. Interestingly, NSSI was reportedly performed for intrapersonal reinforcement 85–90% of the time and for interpersonal reinforcement only

15–20% of the time. Second, NSSI typically is conceptualized as serving an affect regulation function (Klonsky, 2007; Nock & Mendes, 2008), and our results suggest that NSSI frequently serves a cognitive regulation function as well by distracting from unwanted negative thoughts (Najmi et al., 2007). Prior research on the proposed functions of NSSI has shown that individual difference factors can statistically predict engagement in NSSI in the service of intrapersonal vs. interpersonal functions. For instance, elevated physiological arousal in response to stress and the presence of prior attempts to escape distress (i.e., suicide attempts) are particularly associated with the intrapersonal function of NSSI, while the experience of social problems is predictive of the interpersonal functions of NSSI (Nock & Mendes, 2008; Nock & Prinstein, 2005). Future research that integrates these prior findings with the current results, such as by testing the extent to which intrapersonal vs. interpersonal precipitants can predict individual episodes of NSSI in real-time, will be especially useful in further enhancing our understanding of how, why, and among whom individual episodes of SITBs occur.

The ultimate goal of this line of research is the prevention of SITBs, and this study provides new information about what adolescents often do instead of acting on their self-injurious thoughts. The alternative behaviors reported in this study focused largely on actively engaging in activities (e.g., went out, did homework) or interactions (e.g., talked to someone), and less often on more passive behaviors like watching television or sleeping. These results suggest that these and other methods of behavioral activation might be usefully incorporated into interventions aimed at decreasing the occurrence of SITBs (e.g., Wallenstein & Nock, 2007). Notably, however, it will be important to gather more specific data about the alternative behaviors used instead of self-injurious behaviors. For instance, although “went out” (reported above) appears to be a positive alternative to self-injurious behavior, we did not assess what participants did when they “went out,” and it is possible that this included activities such as alcohol/drug use. Future studies must further document and experimentally test these potential alternatives to engaging in self-injurious behavior.

Several important limitations of this study must be considered when interpreting the results. First, the sample was relatively small and not representative of the general population in that it included adolescents and young adults with a recent history of NSSI, was mostly female, and included only those willing to participate in a somewhat demanding research protocol. These selection factors limit generalizations that can be made from these data to people in the general population who experience SITBs at some point in their life. As such, an important next step for future studies is to use EMA methods in a larger, more diverse sample (e.g., more males, older participants) in order to determine which findings generalize to self-injurers as a group, and which are specific to adolescents and young adults with a history of NSSI. Second, although the use of real-time data collection methods has been shown to decrease the influence of recall biases while increasing reliability and ecological validity (Hufford, 2007), it is important to bear in mind that these data are still based on self-report and so are subject to the well-known limitations associated with such data (Nisbett & Wilson, 1977; Takarangi, Garry, & Loftus, 2006). Concerns about the accuracy and validity of self-report are especially important when assessing cognitive and affective processes that may operate partly or wholly outside of conscious awareness. For instance, we relied on participants’ attributions about why they engaged in NSSI; however, it is important to note

that some of the antecedent and consequent events maintaining the participants' NSSI may very well occur outside their awareness. The recent development of performance-based methods of assessing self-injurious thoughts provide new opportunities for circumventing the use of self-report of such thoughts (Nock & Banaji, 2007), and future studies combining such methods with the use of EMA will enhance the understanding of how SITBs occur and change over time. Third, although we attempted to be comprehensive in the domains assessed, we were able to include only a limited range of constructs at each assessment period. SITBs are multi-determined behaviors and this study only scratched the surface of the many factors likely influencing them. Future studies should assess in real-time the broader range of psychological, interpersonal, and biological factors likely influencing the occurrence of these dangerous behaviors.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Participant Characteristics

Variable	%	Range	*M*	*SD*
History of SITB				
NSSI episodes in past year	100.0	3–500	113.4	174.9
Suicide ideation episodes in past year	83.3	0–500	72.1	120.5
Suicide attempts in past year	36.7	0–10	1.2	2.6
Current Psychiatric Diagnosis[1]				
Any mood disorder	50.0			
Major depressive disorder	46.7			
Bipolar disorder	3.3			
Any anxiety disorder	53.3			
Panic disorder	10.0			
Social phobia	13.3			
Specific phobia	13.3			
Generalized anxiety disorder	26.7			
Obsessive-compulsive disorder	6.7			
Post traumatic stress disorder	20.0			
Any eating disorder	13.3			
Anorexia nervosa	6.7			
Bulimia nervosa	10.0			
Any disruptive behavior disorder	6.7			
Oppositional defiant disorder	6.7			
Conduct disorder	6.7			
Any substance use disorder	30.0			
Alcohol use disorder	23.3			
Substance use disorder	13.3			
Any DSM-IV disorder	76.7	0–8	2.1	2.1

Note: SITB = Self-injurious thoughts or behaviors; NSSI = Non-suicidal self-injury.

[1]Psychosis, separation anxiety disorder, enuresis, encopresis, attention-deficit/hyperactivity disorder, and tic disorder were assessed but not present in the sample.

Table 2

Characteristics of Self-Injurious Thoughts

	Suicidal Thoughts %	NSSI Thoughts (NSSI=No) %	NSSI Thoughts (NSSI=Yes) %
Severity			
Not present (0)	3.8	1.7	0.0
Mild (1)	30.8	25.2	1.0
Moderate (2)	53.8	38.5	18.4
Severe (3)	7.7	25.2	32.0
Very severe (4)	3.8	9.4	48.5
Duration			
<5 seconds	0.0	5.0	16.5
5–60 seconds	11.5	20.8	20.4
1–30 minutes	46.2	39.2	40.8
30–60 minutes	15.4	19.6	13.6
1–5 hours	15.4	12.5	7.8
>5 hours	11.5	2.9	1.0

Note. NSSI = non-suicidal self-injury. “NSSI=No” signifies that participants had NSSI thoughts but did not engage in NSSI behavior. “NSSI=Yes” signifies that participants reported both having NSSI thoughts and engaging in the behavior.

Table 3

Co-Occurrence of Self-Injurious Thoughts with Thoughts of Other Self-Destructive Behaviors

	Descriptive Analyses:			HLM analyses: Model 6	
	Suicidal Thoughts %	**NSSI Thoughts (NSSI=No) %**	**NSSI Thoughts (NSSI=Yes) %**	**γ**	***se* (γ)**
Level 1 predictors					
Intercept	--	--	--	2.24	−2.06
Drug use thought	34.6	20.8	18.3	0.32	0.33
Alcohol use thought	19.2	16.7	13.5	−0.59	0.42
Binge thought	19.2	15.4	16.3	0.89	0.53
Purge thought	7.7	15.8	12.5	−0.40	0.49
Unsafe sex thought	7.7	7.1	4.8	0.12	0.56
Impulsive spend thought	3.8	5.8	4.8	0.05	0.61
Suicidal thought	--	4.2	1.0	−0.69	1.06
NSSI thought	42.3	--	--	--	--
Level 2 predictors					
Age	--	--	--	−0.10	0.10
Sex	--	--	--	−0.87	0.54
Variance Components					
$\tau_{00}^{(2)}$	--	--	--	0.61	0.35

Note. NSSI = non-suicidal self-injury.

Table 4

Contexts in Which Self-Injurious Thoughts Occur

	Descriptive Analyses:			**HLM analyses: Model 7**	
"What were you doing?"	**Suicidal Thoughts %**	**NSSI Thoughts (NSSI=No) %**	**NSSI Thoughts (NSSI=Yes) %**	**γ**	***se* (γ)**
Level 1 predictors					
Intercept	--	--	--	0.95	1.59
Socializing	34.6	31.3	21.2	−0.49	0.50
Resting	19.2	22.9	20.2	0.00	0.43
Listening to music	30.8	13.8	17.3	−0.01	0.69
Doing homework	7.7	12.1	19.2	0.69	0.37
TV/Video games	7.7	13.3	14.4	−0.01	0.46
Recreational activities	3.8	10.8	15.4	0.29	0.43
Eating	7.7	11.3	13.5	0.39	0.47
Using drugs	3.8	2.9	4.8	0.89	0.87
Drinking alcohol	0.0	2.5	3.8	0.22	1.57
Level 2 predictors					
Age	--	--	--	−0.05	0.08
Sex	--	--	--	−0.63	0.58
Variance Components					
$\tau_{00}^{(2)}$	--	--	--	0.27	0.31

	Descriptive Analyses:			HLM analyses: Model 8	
"Who were you with?"	Suicidal Thoughts %	NSSI Thoughts (NSSI=No) %	NSSI Thoughts (NSSI=Yes) %	γ	*se* (γ)
Level 1 predictors					
Intercept	--	--	--	0.72	1.90
Alone	42.3	38.3	49.0	0.79 *	0.37

	Descriptive Analyses:			HLM analyses: Model 7	
"What were you doing?"	**Suicidal Thoughts %**	**NSSI Thoughts (NSSI=No) %**	**NSSI Thoughts (NSSI=Yes) %**	**γ**	***se* (γ)**
Peer/other	34.6	29.6	16.3	0.15	0.32
Friend	15.4	12.9	16.3	0.71	0.41
Mother	15.4	11.7	9.6	−0.88	0.65
Father	3.8	6.7	5.8	0.61	1.03
Stranger	3.8	5.8	5.8	0.52	0.42
Sibling	7.7	2.9	3.8	1.02	0.89
Other relative	0.0	0.8	1.9	2.10	1.21
Level 2 predictors					
Age	--	--	--	−0.09	0.10
Sex	--	--	--	−0.38	0.51
Variance Components					
$\tau_{00}^{(2)}$	--	--	--	0.61	0.37

Note. NSSI = non-suicidal self-injury;

* $p<.05$.

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Table 5

Events and Feelings in Which Self-Injurious Thoughts Occur

	Descriptive Analyses:			**HLM analyses: Model 9**	
"What led to the thought?"	**Suicidal Thoughts %**	**NSSI Thoughts (NSSI=No) %**	**NSSI Thoughts (NSSI=Yes) %**	**γ**	***se* (γ)**
Level 1 predictors					
Intercept	--	--	--	1.62	2.09
Worry	38.5	35.0	36.5	0.28	0.21
Memory	34.6	30.8	26.0	−0.57	0.33
Pressure	42.3	27.9	31.7	0.16	0.25
Saw reminder	15.4	16.7	21.2	0.33	0.25
Argument/conflict	38.5	18.3	16.3	−0.22	0.45
Rejection	30.8	16.3	12.5	0.08	0.45
Criticism/insult	15.4	8.8	10.6	0.72	0.41
Other encouraged	3.8	1.7	3.8	0.35	1.27
Level 2 predictors					
Age	--	--	--	−0.09	0.11
Sex	--	--	--	−0.67	0.54
Variance Components					
$\tau_{00}^{(2)}$	--	--	--	0.49	0.31

	Descriptive Analyses:			HLM analyses: Model 10	
"What were you feeling?"	Suicidal Thoughts %	NSSI Thoughts (NSSI=No) %	NSSI Thoughts (NSSI=Yes) %	γ	*se* (γ)
Level 1 predictors					
Intercept	--	--	--	0.36	2.34
Sad/worthless	57.7	37.9	39.8	−0.99***	0.25
Overwhelmed	46.2	33.8	45.6	0.33	0.31

	Descriptive Analyses:			HLM analyses: Model 9	
"What led to the thought?"	**Suicidal Thoughts %**	**NSSI Thoughts (NSSI=No) %**	**NSSI Thoughts (NSSI=Yes) %**	**γ**	***se* (γ)**
Scared/anxious	30.8	31.3	32.0	−0.35	0.35
Angry at self	50.0	21.7	48.5	1.15**	0.43
Self-hatred	50.0	21.7	42.7	1.02*	0.52
Angry at another	53.8	23.3	35.0	0.83*	0.39
Rejected/hurt	46.2	15.0	34.0	1.10**	0.42
Numb/nothing	23.1	9.2	21.4	1.50**	0.49
Level 2 predictors					
Age	--	--	--	−0.02	0.12
Sex	--	--	--	−1.12*	0.48
Variance Components					
$\tau_{00}^{(2)}$	--	--	--	0.86	0.64

Note. NSSI = non-suicidal self-injury;

* *p*<.05,

** *p*<.01,

*** *p*<.001.

Table 6

Alternative Behaviors to Self-Injurious Behaviors

	Suicidal Thoughts %	NSSI Thoughts %
Changed thoughts	26.9	22.3
Talked to someone	34.6	20.7
Went out	15.4	18.2
Work/homework	23.1	15.3
Used computer	11.5	14.0
Listen to music	11.5	11.2
Went to sleep	15.4	9.9
Watched TV/movie	3.8	8.3

Note. NSSI = non-suicidal self-injury.