



Functions of Nonsuicidal Self-Injury Are Differentially Associated with Suicide Ideation and Past Attempts among Childhood Trauma Survivors

MICHELLE E. ROLEY-ROBERTS, PhD, MELISSA J. ZIELINSKI, PhD,
GABRIELA HURTADO, PhD, JOSEPH D. HOVEY, PhD, AND JON D. ELHAI, PhD

Research into factors for suicide has revealed relations between trauma exposure and suicidality (e.g., Bridge, Goldstein, & Brent, 2006; Joiner, Sachs-Ericson, Wingate, Brown, Anestis, & Selby, 2007) wherein painful and provocative experiences (e.g., nonsuicidal self-injury [NSSI]) are an important link (e.g., Van Orden, Witte, Cukrowicz, Braithwaite, Selby, & Joiner, 2010; Smith, 2013). No prior research has assessed the relationship between functions of NSSI and suicidality among childhood trauma survivors. Participants who endorsed childhood trauma exposure ($N = 121$; $M_{\text{age}} = 18.69$, range 18–22) completed measures of posttraumatic stress disorder (PTSD) symptoms, NSSI, and suicidality. Multiple regressions assessing whether the four functions of NSSI predicted suicide ideation and past attempts after controlling for PTSD symptom severity found that only social negative reinforcement was associated with SI ($\beta = .304$, $SE = .243$, $t = 2.23$, $p = .028$), while only automatic negative reinforcement was associated with past attempts ($\beta = .470$, $SE = .066$, $t = 2.25$, $p = .028$). Findings highlight the importance of assessing NSSI functions when assessing suicidality among trauma survivors.

Research into factors that contribute to death by suicide has revealed a robust relation between psychological trauma exposure and suicide ideation and attempts (e.g., adolescents; Bridge, Goldstein, & Brent, 2006; and adults; Joiner et al., 2007). Exposure to painful and provocative experiences is one important factor that ties trauma exposure to suicide risk (e.g., Smith, 2013; Van

Orden et al., 2010). The interpersonal theory of suicide purports that those most likely to die by suicide acquire a capability to act on suicidal urges via habituation to pain and desensitization to the idea of one's own death (Joiner, 2005; Van Orden et al., 2010). Given that trauma is characterized by painful, shocking, stressful, and sometimes life-threatening experiences, trauma

MICHELLE E. ROLEY-ROBERTS, The Ohio State University Wexner Medical Center, Columbus, OH, and University of Arkansas for Medical Sciences, Little Rock, AR, USA; MELISSA J. ZIELINSKI, Psychiatry, University of Arkansas for Medical Sciences, Little Rock, AR, USA; GABRIELA HURTADO, Eating Recovery Center, Austin, TX, and, University of Toledo, Toledo, OH, USA; JOSEPH D. HOVEY,

Psychology, University of Texas-Rio Grande Valley, Edinburg, TX, USA; JON D. ELHAI, Psychology, University of Toledo, Toledo, OH, USA.

Address correspondence to Michelle E. Roley-Roberts, Psychiatry, The Ohio State University Medical Center, 1670 Upham Drive, Suite 460, Columbus, OH 43210; E-mail: michelle.e.roy@gmail.com

exposure could increase suicide risk by increasing one's acquired capability (AC). The purpose of the present investigation was, therefore, to examine whether nonsuicidal self-injury (NSSI) functions, beyond behaviors, predict suicide ideation and attempts among trauma-exposed individuals.

Trauma-exposed individuals demonstrate high rates of behaviors that may contribute to suicidality via increased AC, including engagement in NSSI (Bentley, Cassiello-Robbins, Vittorio, Sauer-Zavala, & Barlow, 2015). *NSSI* refers to the deliberate infliction of physical damage to one's body in the absence of suicidal intent (Nock & Prinstein, 2004) and includes behaviors such as skin cutting, burning, and hitting (Adler & Adler, 2007). A large body of research has examined the relation between NSSI and suicidality, and findings have revealed a robust association (see Hamza, Stewart, & Willoughby, 2012, for a review; see Victor & Klonsky, 2014, for a meta-analysis), although longitudinal data remain highly limited (cf. Guan, Fox, & Prinstein, 2012). Although some researchers have proposed that NSSI exists along a spectrum of suicidality (see Orlando, Broman-Fulks, Whitlock, Curtin, & Michael, 2015), NSSI has long been distinguished from suicidality based on the presence of intent to die. *Suicidality* refers to a constellation of processes (e.g., suicide ideation, intent, plans, attempts) that have been shown to predict increased risk of death by suicide with variable strengths (Goldston, Curry, Wells, & Roley, 2011).

Taken together, traumatic experiences and NSSI engagement appear to increase suicide risk. However, there is evidence to suggest that varying aspects of NSSI (e.g., frequency, methods) may differentially predict suicide attempts (Victor & Klonsky, 2014). NSSI serves a variety of different functions (e.g., emotion regulation, interpersonal influence; Klonsky & Olino, 2008), raising the question of whether underlying reasons for engaging in NSSI, in particular, would be associated differently with

suicidality. We were particularly interested in individuals with a history of childhood maltreatment because extant research has demonstrated a link between NSSI and childhood abuse (e.g., Joiner et al., 2007). Moreover, several studies have found that onset of NSSI behavior is, on average, prior to age 18 (e.g., Klonsky, 2011; Martin et al., 2013), perhaps indicating that individuals' reasons for engaging in NSSI behavior form as they attempt to survive or make meaning of childhood abuse.

THEORIES REGARDING NSSI FUNCTIONS

There is ample evidence that NSSI behaviors are associated with a wide variety of mental health concerns (e.g., Bentley et al., 2015; Victor & Klonsky, 2014). NSSI functions, and not just the presence of the behavior, predict important outcomes such as suicide ideation, plans, and attempts (Paul, Tsypes, Eidlitz, Ernhout, & Whitlock, 2015; Victor, Styer, & Washburn, 2015). The four-factor model of NSSI (Nock & Prinstein, 2004) theorizes that NSSI behavior is maintained through automatic negative reinforcement, automatic positive reinforcement, social positive reinforcement, and social negative reinforcement (see also Lloyd, Kelley, & Hope, 1997). *Automatic negative reinforcement* is the engagement in NSSI in anticipation of taking away or escaping the presence of a negative stimulus (e.g., feeling distress, agitation). *Automatic positive reinforcement* is the engagement in NSSI in anticipation of adding a positive stimulus (e.g., feeling *something* instead of numbness). *Social positive reinforcement* includes engagement in NSSI in anticipation of adding a positive social stimulus (e.g., compassion from others). *Social negative reinforcement* includes engagement in NSSI in anticipation of the removal of a negative social stimulus (e.g., termination of teasing). Automatic negative and positive reinforcement are particularly common in NSSI samples (Klonsky, 2011); consistent with

findings that NSSI successfully regulates momentary affective experiences (Armeij, Crowther, & Miller, 2011).

Research on the relation between NSSI functions and suicidality among adults is limited (Klonsky & Olino, 2008; Paul et al., 2015; Victor et al., 2015), although existing research suggests that NSSI functions may covary with important clinical aspects of the behavior (e.g., methods, severity; Klonsky & Olino, 2008). There was a strong relation between attempts and automatic positive and negative reinforcement and social positive reinforcement in a study of university students (Paul et al., 2015). However, only two function items (i.e., “to help me cry” and “hope someone would notice something is wrong”) were more likely to be endorsed by those reporting suicide ideation. Social negative reinforcement motives were not examined. A second study that used a large clinical sample composed of adolescents and young adults found that suicide ideation was associated with both social and automatic functions of NSSI (Victor et al., 2015). Additional research has examined solely adolescent samples (e.g., Csorba, Dinya, Plener, Nagy, & Páli, 2009; Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Nock & Prinstein, 2005) with mixed findings.

NSSI, Suicide, and Trauma

Research has demonstrated positive relations between posttraumatic stress disorder (PTSD) symptoms and NSSI engagement in a wide variety of participant samples (for a review, see Smith, Kouros, & Meuret, 2014). Among individuals who engage in NSSI, PTSD is a moderate predictor of suicide attempts, along with more commonly investigated risk factors such as borderline personality disorder and depression (Victor & Klonsky, 2014). Moreover, a meta-analysis of the relation between NSSI and emotional disorders revealed that individuals with PTSD are more than twice as likely as individuals without PTSD to have a history of NSSI (Bentley et al., 2015). In

sum, there is evidence to support the proposition that NSSI may emerge as part of a posttraumatic response (Chiang, Mallinckrodt, Soet, & Sevig, 2010).

Prior research has begun to distinguish between risk factors that predict suicide ideation and attempts separately (Klonsky & May, 2014). Specifically, more research has emerged linking sensitivity to pain and fearlessness of death (i.e., acquired capability for suicide) to suicide attempts (Smith, 2013). NSSI behavior has been linked to childhood trauma exposure in particular (e.g., Joiner et al., 2007) and to suicidal behavior (Hamza et al., 2012; Klonsky, May, & Glenn, 2013). Further, Nock and Kessler (2006) found that comorbidity of mental health symptoms (i.e., depressive, impulsive, and aggressive symptoms) and a history of physical and sexual abuse were important distinguishing factors for suicide attempters among self-injurers. Features of NSSI behavior that predict attempts include an earlier age of onset, a greater number of methods used, and the absence of perceived physical pain (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). However, association between NSSI functions and suicidality has not been explored in childhood trauma survivors.

The Current Study

In summary, suicide and NSSI are important public health concerns. Attention to and changes in suicide prevention in the past decade have not effectively decreased the rate of suicide (Insel, 2014). Identification of risk factors that better predict death by suicide risk is needed. While prior research has linked childhood trauma exposure to NSSI behaviors and suicide risk, no prior research has assessed the relationship between functions of NSSI and suicide risk within a sample of childhood trauma survivors. Research examining the various aspects of suicidality separately has found that self-injury in males, anhedonia, previous attempts, intent to die, aggressive and impulsive behaviors, and history of rape and physical abuse have distinguished suicide

attempters among self-injurers (Nock & Kessler, 2006). Sexual molestation and childhood neglect were associated with self-injury but not suicide attempts (Nock & Kessler, 2006). NSSI behaviors have been associated with both suicide ideation and attempts (Klonsky et al., 2013). Thus, in this study, functions of NSSI are examined as predictors of suicide ideation and attempts separately. The interpersonal theory of suicide provides a framework for potential associations between NSSI functions and suicide risk. Specifically, childhood trauma and NSSI (i.e., painful and provocative events) are theorized to lead to an acquired capability for suicide by lowering one's fear of death and increasing one's pain tolerance. Given that NSSI behaviors are theorized to be painful and provocative, we hypothesized that (1) all functions leading to NSSI behaviors would be associated with about the same relative strengths with suicide ideation. Similarly, we theorized that all functions of NSSI would be associated with suicide attempts (cf. Paul et al., 2015). However, we hypothesized that (2) automatic negative reinforcement would be more strongly associated with suicide attempts. This stems from research that the underlying motivation for death by suicide is to escape pain and suffering, which aligns well with the automatic negative reinforcement function of NSSI and the emotional cascade model (Selby, Anestis, & Joiner, 2008).

METHOD

Procedures

Participants for the current study were recruited from introduction to psychology classes at a midwestern public university as part of a larger two-part study examining the relation between childhood trauma and suicide risk. Potential participants ($N = 800$) completed a variety of screening questions when signing up for an online research participant account (SONA Systems). Individuals between the ages of

18 and 22, endorsing trauma exposure prior to the age of 12, and native English speakers ($N = 139$) were recruited for this study. As approved by the university's internal review board, participants who completed the study received class points.

Measures

Demographic Form. Demographics assessed were ethnicity and race, age, year in school, family income, parental occupations, and religious affiliation.

UCLA-PTSD Reaction Index for DSM-5 (UCLA-PTSD). The UCLA-PTSD was used to assess 16 potential trauma types, age (s) at time of exposure, role in event (e.g., witness or victim), response to the event (e.g., "were you afraid you would die?"), current PTSD and dissociative symptoms, and functional impairment of PTSD symptoms. The response format for assessing trauma types and responses to events was Yes/No. Once a participant endorsed a trauma type, they then selected the age(s) the traumatic event occurred (i.e., Trauma History Profile; Pynoos & Steinberg, 2013). The response format for DSM-5 PTSD symptoms and functional impairment was a 5-point response scale ranging from 0 (*None*) to 4 (*Most*) (Pynoos & Steinberg, 2013). The UCLA-PTSD has shown adequate to excellent Cronbach's reliability with youth aged 7–18 (subscale α 's range = .61–.95; Steinberg et al., 2013). In this study, internal consistency reliability was good ($\alpha = .88$). While this measure was created for use with children and adolescents, it has been used with adult samples as well (see Goenjian et al., 2015; Hafstad, Dyb, Jensen, Steinberg, & Pynoos, 2014). This measure was used because of its ability (Roussos et al., 2005) to account for the comorbidity of depressive symptoms (Gallagher & Brown, 2015; Othieno, Okoth, Peltzer, Pengpid, & Malla, 2015).

Nonsuicidal Self-Injury. The Functional Assessment of Self-Mutilation (FASM; Lloyd et al., 1997) was used to assess age at onset of NSSI, 11 potential methods and associated frequencies, and

functions of the behavior (22 items; e.g., “To feel something, even if it was pain,” “To get help,” “To avoid doing something unpleasant you don’t want to do”) during the past year. Functions were rated on a 4-point response scale that ranged from 0 (*Never*) to 3 (*Often*). Four subscales (i.e., automatic negative reinforcement, automatic positive reinforcement, social negative reinforcement, social positive reinforcement) were created from the function items. The measure has adequate psychometric properties and has been used in other studies assessing NSSI as a risk for suicide (Lloyd-Richardson, 2008). In this study, the function subscales showed good internal consistency reliability ($\alpha = .83-.89$).

Beck Scale for Suicide Ideation (BSS). The BSS examines current suicide ideation, past attempts, and level of intent of most recent past attempt. One question was added assessing level of intent of most lethal suicide attempt. Items examining suicide ideation and level of intent had three response options ranging from “0” to “2,” while the item for past attempts was Yes/No. Previous work found that the BSS was able to differentiate survivors from nonsurvivors in a longitudinal sample spanning 9.5 years (Beck & Steer, 1991). The BSS has shown excellent internal consistency (e.g., $\alpha = .81-.96$) when used with college student samples (Beck, Steer, & Ranieri, 1988). In this study, internal consistency was adequate ($\alpha = .88$).

RESULTS

Data Preparation

Eighteen people completed the study despite being ineligible and were thus excluded prior to analyses (13 due to indicating that their trauma occurred after age 12 years old and 5 due to being older than 22 years). Data were then screened for missingness and normality. Items ranged in missingness from 0% to 4.7%. Missing values were estimated using maximum-likelihood

data estimation because fewer than 30% of values were missing (Kline, 2011). Values missing were determined to be missing completely at random based on Little’s MCAR test ($\chi^2 = 23.24$, $df = 30$, $p = .805$). The social negative reinforcement subscale from the FASM scale was skewed and kurtotic, and the lifetime frequency of NSSI behaviors was kurtotic. All other variables were normally distributed (Table 1). The natural log transformation of the social negative reinforcement subscale ($M = 1.22$, $SD = 0.703$, skew = $-.383$, kurtosis = $-.212$) and the lifetime frequency variable ($M = .999$, $SD = 0.618$, skew = $.457$, kurtosis = $.012$) was used in analyses. Data did not violate assumptions of multicollinearity.

Participant Characteristics

After exclusions, the sample included 121 participants ($M_{\text{age}} = 18.69$, range 18–22; 78% female). The majority of participants were Caucasian (67%), followed by African American (20%), Multiracial/Multiethnic (7%), and Latino, American Indian, or Asian (7%). Participants reported experiencing between 1 and 18 different trauma types with a mode of three trauma exposures before age 12. All but three participants also endorsed trauma exposure after age 12 (range = 1–19; mode = 8 lifetime trauma types). The most frequently endorsed traumatic events included natural disasters (45%), verbal/emotional abuse (43%), life-threatening medical illness (35%), violent death of close other (34%), physical abuse (32%), witness domestic violence (30%), physical assault (23%), serious accident (22%), school violence (17%), witness parental substance abuse (17%), neglect (7%), and kidnapped (7%). On average, participants reported that it had been less than a year since any trauma exposure. Twenty-four percent had a probable PTSD diagnosis based on DSM-5 criteria (i.e., presence of one or more intrusion symptoms, one or more avoidance symptoms, two or more negative alterations in cognitions and mood symptoms, and two or more alterations in arousal

TABLE 1
Correlation and Means and Standard Deviations of Main Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Past suicide attempt	1	.24	.63**	.36***	.48***	.48***	.45***	.27**	.23*
2. Last attempt lethality		1	.60**	.31	.52**	.07	-.08	.09	-.16
3. Worst attempt lethality			1	.38	.43*	.15	.19	.02	-.20
4. Suicide ideation past year				1	.71***	.33***	.36***	.26*	.16
5. Suicide ideation current					1	.42***	.41***	.37**	.24*
6. Automatic negative reinforcement						1	.82***	.53***	.63***
7. Automatic positive reinforcement							1	.31**	.52***
8. Social negative reinforcement								1	.68***
9. Social positive reinforcement									1
Mean (SD)	0.44 (0.73)	0.33 (0.48)	1.13 (0.82)	2.36 (1.32)	3.13 (4.69)	2.36 (2.35)	2.85 (2.89)	1.64 (2.77)	3.16 (4.33)

*** $p < .001$. ** $p < .01$. * $p < .05$.

and reactivity symptoms; Pynoos & Steinberg, 2013; Steinberg et al., 2013).

Regarding past-year suicide ideation, 9% reported thinking about killing themselves five or more times a month, 4% reported three to four times a month, 14% reported two times a month, 30% reported one time a month, and 42% reported never thinking about killing themselves. Further, 9% of the sample indicated having made a previous suicide attempt. Of those who have made a prior attempt, 82% stated that during their last attempt, their intent to die was low; the others declined to answer this question. When asked about most lethal suicide attempt, 82% indicated that their intent to die was moderate, and again, two individuals chose not to answer.

Engagement in at least one method of NSSI was endorsed by 60%. Of those who endorsed engagement in NSSI, 29% reported using only one method of self-harm, 30% used two different methods, 14% used three methods, 10% used four methods, and 18% used five or more methods. The mean number of types of NSSI behaviors used was 2.89 ($SD = 2.10$; range = 10). The average frequency of NSSI behaviors in the past year was 31.36 ($SD = 60.99$; range = 286). The age of onset of NSSI behaviors ranged from 5–19 years old ($M_{age} = 17.88$; $SD = 5.39$). The most highly endorsed NSSI behaviors included self-hitting (42%), skin cutting/carving (34%), and self-biting (29%). Refer to Table 1 for descriptives on the functions of NSSI behaviors.

Regression Analyses

To assess whether NSSI functions were predictors of suicide risk, we conducted two multiple regression analyses using IBM SPSS v.21 (IBM Corp., Armonk, NY, USA). The first regression assessed whether the four functions were associated with suicide ideation. The second regression assessed whether the four functions were associated with past attempts. In both regression analyses, automatic negative reinforcement, automatic positive reinforcement, social negative

reinforcement, and social positive reinforcement were entered simultaneously in Step 2 while controlling for PTSD symptom severity, number of means, and frequency of NSSI behaviors in Step 1. Only participants who endorsed NSSI behaviors ($n = 73$) were included in the analyses.

In the first regression analysis, social negative reinforcement was statistically significantly associated with suicide ideation ($\beta = .304$, $SE = .243$, $t = 2.23$, $p = .028$). Social positive, automatic positive, and automatic negative reinforcement were not associated with suicide ideation ($\beta = -.280$, $SE = .155$, $t = -1.97$, $p = .051$; $\beta = .233$, $SE = .287$, $t = 1.26$, $p = .210$; $\beta = .157$, $SE = .378$, $t = .157$, $p = .429$, respectively). In the second regression, only automatic negative reinforcement had a significant association of past suicide attempts ($\beta = .470$, $SE = .066$, $t = 2.25$, $p = .028$). Automatic positive, social negative, and social positive reinforcements were not associated with past attempts ($\beta = .108$, $SE = .051$, $t = .539$, $p = .592$; $\beta = .046$, $SE = .043$, $t = .279$, $p = .781$; $\beta = -.145$, $SE = .030$, $t = -.832$, $p = .409$, respectively). Tests for collinearity indicated that variables were collinear (*Tolerance* ranged = .176–.372; *VIF* ranged = 2.69–5.69). Results were compared to established standards of tolerance values $>.10$ and *VIF* values <10 indicative of collinearity in regression models (Fields, 2013). Post hoc power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) found a power of .73 for a sample size of 73 detecting a medium effect.

DISCUSSION

This study is the first to examine relationships between NSSI functions and suicidality in a trauma-exposed sample. We found that NSSI was associated with suicidality even after controlling for other risk factors, consistent with past research (e.g., Hawton & Harriss, 2007; Nock et al., 2006). We extended past research and found that NSSI functions were

differentially associated with aspects of suicidality in childhood trauma survivors. Specifically, social negative reinforcement was the only function associated with suicide ideation, while the only function associated with a history of suicide attempts was automatic negative reinforcement.

Our findings were surprising given that past research has found both automatic and social functions of NSSI to be associated with suicide ideation and attempts (Paul et al., 2015; Victor et al., 2015). However, our study had a specific sample of interest (i.e., childhood trauma survivors). It could be that trauma exposure altered the nature of NSSI functions and risk for suicide. Childhood trauma is associated with emotion regulation difficulties (Marusak, Martin, Etkin, & Thomason, 2015), suggesting that trauma may disrupt the development of adaptive coping skills. NSSI may emerge as a viable reducer of negative emotions in the absence of other effective options. Indeed, approximately 60% of our larger sample reported a history of NSSI—a rate above those found in more general populations (Klonsky, 2011).

While suicide ideation can be disturbing, it is a weaker risk factor for death by suicide when compared to history of previous attempts (Van Orden et al., 2010). Therefore, engagement in NSSI that is motivated by a desire to reduce or escape negative feelings (i.e., automatic negative reinforcement) may be of particular concern with regard to clinical management of suicidality. Again, while NSSI is effective in reducing immediate emotional arousal (Paul et al., 2015), self-injuring to regulate internal emotional states may have the unintended consequence of increasing the capacity to hurt oneself (i.e., increased AC) and ultimately to attempt suicide. That is, individuals may repeatedly use NSSI to cope with the high levels of negative emotions they experience (e.g., anxiety, depression, aggression; Filiege, Lee, Grimm, & Klapp, 2009), while unwittingly increasing their tolerance for pain (e.g., Nock et al., 2006), which then further increases their

risk of dying by suicide. Although both intervention and longitudinal data are needed, our results preliminarily suggest that clinicians may benefit from working with self-injuring clients on other options for internal emotion regulation strategies as one potential way to reduce suicide risk. Therapies that focus on building skills for regulating strong emotions and tolerating distress (e.g., dialectical behavior therapy, cognitive behavioral therapy) are particularly effective in reducing self-injurious behaviors and death by suicide (Turner, Austin, & Chapman, 2014).

It is compelling that the two motives found to be associated with aspects of suicidality were related to negative reinforcement, suggesting that the relation between NSSI and suicidality may largely center around a desire to escape, whether it be internal feeling states or external social circumstances. Trauma negatively impacts individuals' views of themselves and the world (Fischer & Ayoub, 1994); thus, escape/avoidance may be particularly salient for childhood trauma survivors, especially when distressed by internal or social stimuli. The interpersonal theory of suicide posits that suicide ideation and suicide attempts operate on qualitatively different planes (Van Orden et al., 2010). This would suggest that while ideation may increase risk for some individuals, ideation and attempts are quite different risk factors for suicide. In this way, the functions of NSSI associated with each may have qualitative differences, as was found in our study. It could be that an individual might attempt to regulate the internal experience of distress, which previous research suggests reduces arousal, pain, and discomfort (Klonsky, Glenn, Styer, Olino, & Washburn, 2015). NSSI can also help in reducing aversive tasks associated with social settings. For example, people with distressing social stimuli are likely still engaged in the world and as such, suicide ideation may be more comforting than social rejection.

Notably, the majority of individuals engage in NSSI for multiple functions

(Nock & Prinstein, 2004), and all social and automatic functions are highly intercorrelated (Klonsky et al., 2015). Thus, the relationship between functions of NSSI and suicide risk is likely a dynamic, rather than linear, one. Therefore, clinicians would benefit from considering the entire constellation of functions that NSSI may be serving for a particular client, as well as the client's history with regard to suicidality, to select appropriate interventions.

LIMITATIONS AND FUTURE DIRECTIONS

The present study was not without limitations. The use of a college student sample limits the generalizability of the findings. Childhood sexual abuse was lower in our sample than in other studies assessing NSSI and childhood trauma. Results may differ in samples with higher rates of childhood sexual abuse. Additionally, given the low sample size of those with prior suicide attempts, our regression analysis was underpowered and should be replicated with larger samples. Further, we may have missed associations between other functions of NSSI and suicide risk due to low power. The low frequency of suicide attempts may explain why we did not find a relation between other NSSI functions and suicide attempts. Our study was limited by the fact that not everyone had a history of NSSI, and therefore, we were unable to assess NSSI functions and suicidality for everyone in the sample. The UCLA-PTSD-RI for DSM-5 has not been validated with a college student sample. The time frames of each of the measures were not consistent, and thus, we are unable to determine causation between variables or establish temporal relationships. Reliance on self-report measures introduced the possibility of reporting errors and response biases. The use of cross-sectional data limited our ability to examine variables across the time frame we were interested in and may have led us to miss individuals who, for example, have a history of suicide ideation, but who are not currently

ideating, or a history of NSSI, but not in the past year. The design of future studies should be longitudinal and occur within a year or

6 months of traumatic events to disentangle course of NSSI and suicide risk, as well as assess its impact on development.

REFERENCES

- ADLER, P. A., & ADLER, P. (2007). The demedicalization of self-injury: From psychopathology to sociological deviance. *Journal of Contemporary Ethnography*, *36*, 537–570.
- ARMEY, M. F., CROWTHER, J. H., & MILLER, I. W. (2011). Changes in ecological momentary reported affect associated with episodes of nonsuicidal self-injury. *Behavior Therapy*, *42*, 579–588.
- BECK, A., & STEER, R. (1991). *Manual for the Beck Scale for Suicidal Ideation*. San Antonio, TX: Psychological Corporation.
- BECK, A. T., STEER, R. A., & RANIERI, W. F. (1988). Scale for Suicide Ideation: Psychometric properties of a self-report version. *Journal of Clinical Psychology*, *44*, 499–505.
- BENTLEY, K. H., CASSIELLO-ROBBINS, C. F., VITTORIO, L., SAUER-ZAVALA, S., & BARLOW, D. H. (2015). The association between nonsuicidal self-injury and the emotional disorders: A meta-analytic review. *Clinical Psychology Review*, *37*, 72–88.
- BRIDGE, J. A., GOLDSTEIN, T. R., & BRENT, D. A. (2006). Adolescent suicide and suicidal behavior. *Journal of Child Psychology and Psychiatry*, *47*(3–4), 372–394.
- CHIANG, H. L., MALLINCKRODT, B., SOET, J., & SEVIG, T. (2010). Developing a screening instrument and at-risk profile for nonsuicidal self-injurious behavior in college women and men. *Journal of Counseling Psychology*, *57*, 128–139.
- CSORBA, J., DINYA, É., PLENER, P., NAGY, E., & PÁLI, E. (2009). Clinical diagnoses, characteristics of risk behaviour, differences between suicidal and non-suicidal subgroups of Hungarian adolescent outpatients practising self-injury. *European Child & Adolescent Psychiatry*, *18*, 309–320.
- FAUL, F., ERDFELDER, É., BUCHNER, A., & LANG, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149–1160.
- FIELDS, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Thousand Oaks, CA: Sage.
- FILIEGE, H., LEE, J. R., GRIMM, A., & KLAPP, B. F. (2009). Risk factors and correlates of deliberate self-harm behavior: A systematic review. *Journal of Psychosomatic Research*, *66*, 477–493.
- FISCHER, K. W., & AYOUB, C. (1994). Affective splitting and dissociation in normal and maltreated children: Developmental pathways for self in relationships. In D. Cicchetti & S. Toth (Eds.), *Rochester symposium on developmental psychopathology Vol. 5: The self and its disorders* (pp. 149–222). Rochester, NY: University of Rochester Press.
- GALLAGHER, M. W., & BROWN, T. A. (2015). Bayesian analysis of current and lifetime comorbidity rates of mood and anxiety disorders in individuals with posttraumatic stress disorder. *Journal of Psychopathology and Behavioral Assessment*, *37*, 60–66.
- GOENJIAN, A. K., NOBLE, E. P., STEINBERG, A. M., WALLING, D. P., STEPANYAN, S. T., DANDERKAR, S., & BAILEY, J. N., (2015). Association of COMT and TPH-2 genes with DSM-5 based PTSD symptoms. *Journal of Affective Disorders*, *172*, 472–478.
- GOLDSTON, D. B., CURRY, J. F., WELLS, K. C., & ROLEY, M. E. (2011). Assessment and treatment of suicidal behavior. In Y. Kaminer & K. Winter (Eds.), *Clinical manual of adolescent substance abuse treatment* (pp. 349–377). Arlington, VA: American Psychiatric Publishing.
- GUAN, K., FOX, K. R., & PRINSTEIN, M. J. (2012). Nonsuicidal self-injury as a time-invariant predictor of adolescent suicide ideation and attempts in a diverse community sample. *Journal of Consulting and Clinical Psychology*, *80*, 842–849.
- HAFASTAD, G. S., DYB, G., JENSEN, T. K., STEINBERG, A. M., & PYNOOS, R. S. (2014). PTSD prevalence and symptom structure of DSM-5 criteria in adolescents and young adults surviving the 2011 shooting in Norway. *Journal of Affective Disorders*, *169*, 40–46.
- HAMZA, C. A., STEWART, S. L., & WILLOUGHBY, T. (2012). Examining the link between nonsuicidal self-injury and suicidal behavior: A review of the literature and an integrated model. *Clinical Psychology Review*, *32*, 482–495.
- HAWTON, K., & HARRISS, L. (2007). Deliberate self-harm in young people: Characteristics and subsequent mortality in a 20-year cohort of patients presenting to hospital. *Journal of Clinical Psychiatry*, *68*, 1574–1583.
- INSEL, T. (February 5, 2014). *Director's blog: A new research agenda for suicide prevention*. National Institute of Mental Health. Retrieved May 2015 from <http://www.nimh.nih.gov/about/director/2014/a-new-research-agenda-for-suicide-prevention.shtml#1>.

- JOINER JR., T. E. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.
- JOINER JR., T. E., SACHS-ERICSSON, N. J., WINGATE, L. R., BROWN, J. S., ANESTIS, M. D., & SELBY, E. A. (2007). Childhood physical and sexual abuse and lifetime number of suicide attempts: A persistent and theoretically important relationship. *Behaviour Research and Therapy*, *45*, 539–547.
- KLINE, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: Guilford.
- KLONSKY, E. D. (2011). Non-suicidal self-injury in United States adults: Prevalence, sociodemographics, topography, and functions. *Psychological Medicine*, *41*, 1981–1986.
- KLONSKY, E. D., GLENN, C. R., STYER, D. M., OLINO, T. M., & WASHBURN, J. J. (2015). The functions of nonsuicidal self-injury: Converging evidence for a two-factor structure. *Child and Adolescent Psychiatry and Mental Health*, *9*, 1–9.
- KLONSKY, E. D., & MAY, A. M. (2014). Differentiating suicide attempters from suicide ideators: A critical frontier for suicidology research. *Suicide and Life-Threatening Behavior*, *44*, 1–5.
- KLONSKY, E. D., MAY, A. M. & GLENN, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology*, *122*, 231–237.
- KLONSKY, E. D., & OLINO, T. M. (2008). Identifying clinically distinct subgroups of self-injurers among young adults: A latent class analysis. *Journal of Consulting and Clinical Psychology*, *76*, 22–27.
- LLOYD, E. E., KELLEY, M. L., & HOPE, T. (1997). *Self-mutilation in a community sample of adolescents: Descriptive characteristics and provisional prevalence rates*. Poster session presented at the annual meeting of the Society for Behavioral Medicine, New Orleans, LA.
- LLOYD-RICHARDSON, E. E. (2008). Adolescent nonsuicidal self-injury: Who is doing it and why? *Journal of Developmental and Behavioral Pediatrics*, *29*, 216–218.
- LLOYD-RICHARDSON, E. E., PERRINE, N., DIERKER, L., & KELLEY, M. L. (2007). Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. *Psychological Medicine*, *37*, 1183–1192.
- MARTIN, J., CLOUTIER, P. F., LEVESQUE, C., BUREAU, J., LAFONTAINE, M., & NIXON, M. K. (2013). Psychometric properties of the functions and addictive features scales of the Ottawa Self-Injury Inventory: A preliminary investigation using a university sample. *Psychological Assessment*, *25*, 1013–1018.
- MARUSAK, H. A., MARTIN, K. R., ETKIN, A., & THOMASON, M. E. (2015). Childhood trauma exposure disrupts the automatic regulation of emotional processing. *American College of Neuropsychopharmacology*, *40*, 1250–1258.
- NOCK, M. K., JOINER JR., T. E., GORDON, K. H., LLOYD-RICHARDSON, E., & PRINSTEIN, M. J. (2006). Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research*, *144*, 65–72.
- NOCK, M. K., & PRINSTEIN, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, *72*, 885–890.
- NOCK, M. K., & KESSLER, R. C. (2006). Prevalence of and risk factors for suicide attempts versus suicide gestures: Analysis of the national comorbidity study. *Journal of Abnormal Psychology*, *115*, 616–623.
- NOCK, M. K., & PRINSTEIN, M. J. (2005). Contextual features and behavioral functions of self-mutilation among adolescents. *Journal of Abnormal Psychology*, *114*, 140–146.
- ORLANDO, C. M., BROMAN-FULKS, J. J., WHITLOCK, J. L., CURTIN, L., & MICHAEL, K. D. (2015). Nonsuicidal self-injury and suicidal self-injury: A taxometric investigation. *Behavior Therapy*, *46*, 824–833.
- OTHIENO, C. J., OKOTH, R., PELTZER, K., PENGPID, S., & MALLA, L. O. (2015). Traumatic experiences, posttraumatic stress symptoms, depression, and health-risk behavior in relation to injury among University of Nairobi students in Kenya. *International Journal of Psychiatry in Medicine*, *50*, 299–316.
- PAUL, E., TSYPES, A., EIDLITZ, L., ERNHOUT, C., & WHITLOCK, J. (2015). Frequency and functions of non-suicidal self-injury: Associations with suicidal thoughts and behaviors. *Psychiatry Research*, *225*, 276–282.
- PYNOOS, R. S., & STEINBERG, A. M. (2013). *UCLA PTSD Reaction Index for Children/Adolescents DSM-5*. Los Angeles, CA: National Center for Child Traumatic Stress.
- ROUSSOS, A., GOENJIAN, A. K., STEINBERG, A. M., SOTIROPOULOU, C., KAKAKI, M., KABAKOS, C., ET AL. (2005). Posttraumatic stress and depressive reactions among children and adolescents after the 1999 earthquake in Ano Liosia, Greece. *The American Journal of Psychiatry*, *162*, 530–537.
- SELBY, E. A., ANESTIS, M. D., & JOINER, T. E. (2008). Understanding the relationship between emotional and behavioral dysregulation: Emotional cascades. *Behaviour Research and Therapy*, *46*, 593–611.
- SMITH, P. N. (2013). *Trauma, life events, & the acquired capability for suicide: What's risky about a risk factor?* Oral presentation presented at

the 42nd Delaware Summer Institute on Substance Abuse & Mental Health, Newark, DE.

SMITH, N. B., KOUROS, C. D., & MEURET, A. E. (2014). The role of trauma symptoms in nonsuicidal self-injury. *Trauma, Violence, & Abuse, 15*, 41–56.

STEINBERG, A. M., BRYMER, M. J., KIM, S., GHOSH, C., OSTROWSKI, S. A., GULLEY, K., ET AL. (2013). Psychometric properties of the UCLA PTSD Reaction Index: Part 1. *Journal of Traumatic Stress, 26*, 1–9.

TURNER, B., AUSTIN, S. B., & CHAPMAN, A. L. (2014). Treating nonsuicidal self-injury: A systematic review of psychological and pharmacological interventions. *Canadian Journal of Psychiatry, 59*, 578–585.

VAN ORDEN, K. A., WITTE, T. K., CUKROWICZ, K. C., BRAITHWAITE, S. R., SELBY,

E. A., & JOINER, T. E. (2010). The interpersonal theory of suicide. *Psychological Review, 117*, 575–600.

VICTOR, S. E., & KLONSKY, E. D. (2014). Correlates of suicide attempts among self-injurers: A meta-analysis. *Clinical Psychology Review, 34*, 282–297.

VICTOR, S. E., STYER, D., & WASHBURN, J. J. (2015). Characteristics of nonsuicidal self-injury associated with suicidal ideation: Evidence from a clinical sample of youth. *Child and Adolescent Psychiatry and Mental Health, 9*, 1–8.

Manuscript Received: October 24, 2015

Revision Accepted: June 9, 2016