Identifying Suicide Typologies Among Trauma-Exposed Veterans
Exploring the Role of Affective Impulsivity

Nadia Bounoua1, Jasmeet P. Hayes2,3, and Naomi Sadeh1

1Department of Psychological and Brain Sciences, University of Delaware, Newark, DE, USA
2Department of Psychology, National Center for PTSD at VA Boston Healthcare System, The Ohio State University, Columbus, OH, USA
3Department of Psychiatry, Boston University School of Medicine, Boston, MA, USA

Abstract. Background: Suicide among veterans has increased in recent years, making the identification of those at greatest risk for self-injurious behavior a high research priority. Aims: We investigated whether affective impulsivity and risky behaviors distinguished typologies of self-injurious thoughts and behaviors in a sample of trauma-exposed veterans. Method: A total of 95 trauma-exposed veterans (ages 21–55; 87% men) completed self-report measures of self-injurious thoughts and behaviors, impulsivity, and clinical symptoms. Results: A latent profile analysis produced three classes that differed in suicidal ideation, suicide attempts and nonsuicidal self-injury (NSSI): A low class that reported little to no self-injurious thoughts or behaviors; a self-injurious thoughts (ST) class that endorsed high levels of ideation but no self-harm behaviors; and a self-injurious thoughts and behaviors (STaB) class that reported ideation, suicide attempts and NSSI. Membership in the STaB class was associated with greater affective impulsivity, disinhibition, and distress/arousal than the other two classes. Limitations: Limitations include an overrepresentation of males in our sample, the cross-sectional nature of the data, and reliance on self-report measures. Conclusion: Findings point to affective impulsivity and risky behaviors as important characteristics of veterans who engage in self-injurious behaviors.

Keywords: nonsuicidal self-injury, suicide attempts, latent profile analysis

Former active duty veterans are at an increased risk for suicide compared with the general population, with rates of suicide among this at-risk population steadily increasing (Bullman, Schneiderman, & Bossarte, 2018; Elbogen et al., 2018). Trauma exposure may directly and indirectly increase their risk of suicide attempts and nonsuicidal self-injury (NSSI; Bryan, Bryan, & Clemons, 2015; Dillon et al., 2018; Jakob, Lamp, Rauch, Smith, & Buchholz, 2017). However, not all individuals exposed to trauma manifest self-injurious behaviors, suggesting that there is important variance in suicide-related responses to stress. Identifying factors that differentiate suicidal ideators from those who engage in self-harm behaviors is an important step for predicting suicide risk in stress-exposed samples (Klonsky & May, 2014).

Impulsivity has been identified as one putative mechanism underlying self-injurious behaviors that may differentiate adults who engage in suicidal attempts and NSSI from those who only report suicidal ideation (Simon et al., 2001). Indeed, several theories of suicide feature impulsivity as a risk factor for self-injurious behaviors (Joiner, 2005; O’Connor, 2011). Empirical evidence also points to impulsivity as a key correlate of suicidal behaviors (Dhingra, Boduszek, & O’Connor, 2015; Horesh et al., 2001), although support for the strength and nature of this association is mixed in the literature. In the case of NSSI, Liu, Trout, Hernandez, Cheek, and Gerlus (2017) found a small association with behavioral impulsivity, while a meta-analysis by Hamza, WIloughby, and Heffer (2015) reported no significant pooled effect. Similarly, while some meta-analytic results point to an association between impulsivity and suicide attempts (Liu et al., 2017), others have noted that this association is small in nature (Anestis, Soberay, Gutierrez, Hernandez, & Joiner, 2014). In addition to methodological differences that should be considered, this pattern of findings suggests that the link between impulsivity, NSSI, and suicidal ideation and attempts is complex and may not be direct. For example, impulsivity may be indirectly related to self-harming behaviors through other mechanisms, such as acquired capability for painful and/or provocative events (Anestis et al., 2014; Joiner, 2005; O’Connor, 2011). Further, this association may vary across samples. Notably, recent research has identified that impulsivity may be a particularly salient risk factor for later engagement in self-injurious and other risky behaviors among veteran samples (Baer et al., 2018; Colborn et al., 2017).

One aspect of impulsivity that may be particularly relevant for self-injurious behaviors is the affective context...
that generates impulsive behavior. Indeed, previous research has shown that poor behavioral control tends to occur when individuals are seeking rewarding experiences (Horvath & Zuckerman, 1993) or experiencing intense negative emotions (Whiteside, Lynam, Miller, & Reynolds, 2005). Previous research has pointed to links between negative affectivity and NSSI and suicide attempts (Anestis & Joiner, 2011; Anestis, Pennings, Lavender, Tull, & Gratz, 2013; Hamza et al., 2015). However, to our knowledge, these associations have not yet been explored among trauma-exposed veterans.

The goals of the current study were to examine whether empirically derived typologies of trauma-exposed veterans emerge based on rates of self-injurious thoughts and behaviors, and whether these typologies show distinct associations with engagement in risky behavior and indices of trait and affective impulsivity. Previous work shows that impulsivity is a risk factor for both NSSI and suicidal attempts (Anestis & Joiner, 2011; Anestis et al., 2013) and that NSSI and suicide attempts have high rates of co-occurrence in veteran samples (Bryan & Bryan, 2014). Furthermore, researchers have speculated that impulsivity may be particularly salient for understanding self-injurious thoughts and behaviors in military samples, given the elevated rates of impulsivity-related problems in these samples (e.g., aggression, addiction, antisocial behavior) (Baer et al., 2018). On the basis of this literature, we expect three typologies characterized by unique constellations of suicidal ideation and self-injurious behaviors to emerge: (1) veterans with no history of self-injurious thoughts or behaviors; (2) veterans with suicidal ideation, but no self-injurious behaviors (i.e., low-impulsivity group); and (3) veterans with high levels of suicidal ideation and self-injurious behaviors (i.e., high-impulsivity group). We predicted that veterans who engage in self-injurious behaviors would report more engagement in other risky behaviors and greater trait and affective impulsivity than those without a history of suicide attempts or NSSI.

Method

Sample

Participants included 95 trauma-exposed veterans ages 21–55 (Mage = 41.51, SD = 9.27; 87.4% male). Veterans were recruited from the VA Boston Healthcare System through flyers posted in the hospital, a database of research volunteers, and outpatient and residential psychotherapy groups (although not all participants were treatment-seeking). Veterans were eligible to participate if they were between the ages of 18 and 55 and experienced at least one traumatic event; they were excluded if they had a prior history of a psychotic disorder. Most veterans were Caucasian (76%), followed by African American (23.2%), and Asian American (4.2%). Approximately half (48%) were either unemployed or receiving disability payments, and others were working full time (28%), part time (11%), or indicated some other employment status (13%). Over half of the participants served in the Iraq/Afghanistan wars (56.4%), followed by Operation Desert Storm (23.4%), or another era of service (19.2%). Veterans were enlisted in the Army (57.9%), Marines (21.1%), Navy (13.7%), Air Force (9.5%), or another branch of the military (4.2%). The VA Boston Healthcare System and relevant Institutional Review Boards approved all study procedures.

Measures

Inventory of Statements About Self-Injury (ISAS)

An abbreviated version of the ISAS (Klonsky & Glenn, 2009) was administered to assess lifetime frequency of engagement in NSSI. In this version, participants were not asked to report on motivations for NSSI. To reduce positive skewness, responses were categorized into five bins that constrained the range of possible responses at the high end of the distribution: 0, 1–10, 11–50, 51–100, > 100 times. A total score was calculated, reflecting lifetime engagement in NSSI self-injury (Cronbach’s α = .85).

Sheehan Suicidality Tracking Scale (STS)

A modified version of the STS (Coric, Stock, Pultz, & Marcus, 2009) was used to assess past suicidal ideation, suicide attempts, and NSSI. We modified the STS by using a Yes/No scale (as opposed to a Likert scale) and asking about lifetime engagement in these thoughts and behaviors (rather than past week).

Risky, Impulsive, and Self-Destructive Behavior Questionnaire (RISQ)

The RISQ (Sadeh & Baskin-Sommers, 2017) is a 38-item self-report questionnaire that measures frequency of a range of risky and impulsive behaviors, including drug use, aggression, self-injurious thoughts and behaviors, gambling, risky sexual behavior, heavy alcohol use, impulsive eating, and reckless driving/spending behavior. Participants reported how many times they engaged in each behavior in their lifetime and in the past month. To reduce positive skewness, responses were categorized into five bins that constrained the range of possible responses at the high end of the distribution: 0, 1–10, 11–50, 51–100, > 100 times (Sadeh & Baskin-Sommers, 2017). Total past month risky behavior (excluding self-harm items; Cron-
of 8.1 ($SD = 2.6$) different types of traumatic experiences, including assault (84%), transportation accident (89%), natural disaster (71%), combat (65%), fire or explosion (45%), exposure to toxic substances (56%), serious accident (48%), sexual assault (31%), causing injury/death to another person (31%), life-threatening illness/injury (30%), severe human suffering (22%), sudden death of another (15%), and captivity (10%).

### Data Analysis

Latent profile analysis (LPA) was used to identify typologies of individuals who engage in self-injurious thoughts and behaviors using standardized and summed scores: (1) suicidal ideation questions from RISQ and STS (three indicators; Cronbach’s $\alpha = .89$), (2) suicide attempt questions from the RISQ and STS (two indicators, Cronbach’s $\alpha = .90$), and (3) NSSI questions from the ISAS, RISQ, and STS (three indicators; Cronbach’s $\alpha = .84$). The purpose of this analytic approach is to not identify nonoverlapping groups in terms of individuals’ reports of self-injurious thoughts and behaviors. Rather, the LPA evaluates whether there are subtypes (or groupings) of individuals who exhibit different constellations or typologies of self-injurious thoughts and behaviors (see Hoehne, 1980). LPA was performed in Mplus-8 using the maximum likelihood robust estimator (Muthén & Muthén, 2013).

Model fit was evaluated using the Bayesian information criterion (BIC), the bootstrap likelihood ratio test (bootstrap LRT), and the Lo–Mendell–Rubin adjusted likelihood ratio test (LMR). The log-likelihood and entropy of each of these class solutions are also included. Conditional probabilities of class membership were then examined in relation to external clinical variables using nonparametric Spearman correlations. Differences in the magnitude of pairs of associations between external variables and the probability of membership in different latent classes were evaluated using a test of dependent correlations (Lee & Preacher, 2013, available at http://quantpsy.org). The maximum amount of missingness across all variables was 0.1%.

### Results

#### Self-Injurious Thoughts and Behaviors

Most of the sample endorsed a lifetime history of self-injurious thoughts and behaviors. In all, 62% of veterans reported lifetime suicidal ideation, 31% reported lifetime suicide attempts, and 55% reported NSSI.
Typologies of Self-Injurious Thoughts and Behaviors

Model fit for LPA solutions with two to four latent classes were examined, and fit statistics are provided in Table 1. The LMR indicated that models with two and three classes showed improved fit over those with one fewer class, but the four-class solution did not provide further improvement (p > .05). The three-class solution was the best fitting model, as it had a lower BIC value than the two-class solution and showed good mean latent class probabilities (mean for Class 1 = 0.99, Class 2 = 1.00, Class 3 = 0.99). The first class (47% of the sample), termed low, consisted of individuals who reported little to no suicidal ideation, suicide attempts, or NSSI. A second, self-injurious thoughts and behaviors (STaB) class (23% of the sample) consisted of individuals characterized by suicidal ideation, suicide attempts, and NSSI behaviors. The third, self-injurious thoughts (ST), class (30% of the sample) consisted of individuals who endorsed suicidal ideation, but not attempts or NSSI (see Figure 1).

Clinical Correlates of Self-Injurious Typologies

Next, we tested for differences in the magnitude of associations between external clinical variables and probability of membership in the different classes. Results are shown in Table 2.

Impulsivity

Probability of membership in the STaB class was more strongly associated with measures of trait impulsivity and past-month risky behavior than membership in the other two classes. Additionally, probability of membership in all three classes differed in the Valence Motivation of risky behaviors. Probability of membership in the low class was more strongly associated with engaging in risky behaviors to satisfy approach motivations (e.g., to attain feelings of pleasure or excitement) than membership in the other two classes. By contrast, probability of membership in the STaB class was more strongly associated with engaging in risky behaviors to satisfy avoidance motivations than membership in the other two classes. Probability of membership in the low class was also more strongly associated with lower

<table>
<thead>
<tr>
<th>No. latent classes</th>
<th>Log-likelihood</th>
<th>BIC</th>
<th>Adjusted BIC</th>
<th>Adjusted LMR LRT p</th>
<th>Bootstrap LRT p</th>
<th>Entropy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Class</td>
<td>-574.37</td>
<td>1,194.27</td>
<td>1,162.70</td>
<td>.0016</td>
<td>&lt; .001</td>
<td>.99</td>
</tr>
<tr>
<td>3-Class</td>
<td>-532.25</td>
<td>1,128.25</td>
<td>1,084.05</td>
<td>.0004</td>
<td>&lt; .001</td>
<td>.99</td>
</tr>
<tr>
<td>4-Class</td>
<td>-513.73</td>
<td>1,109.42</td>
<td>1,052.59</td>
<td>.2039</td>
<td>&lt; .001</td>
<td>.98</td>
</tr>
</tbody>
</table>

Arousal Motivation than the other two groups, suggesting risky/impulsive behavior in this class is less likely to be motivated by intense emotions than in the groups endorsing self-injurious thoughts and behaviors.

Trauma, Mood, and Anxiety
Probability of membership in the low class was associated with less general distress and fewer current PTSD symptoms than probability of membership in the STaB and ST classes. Notably, membership in the STaB and ST classes was unrelated to the extent of trauma exposure, depression, or PTSD symptoms. Finally, all three classes differed on anxious arousal, with probability of class membership in the STaB class showing the strongest positive association and membership in the low class showing the strongest inverse association.

Discussion
Understanding risk for suicidal thoughts and behaviors among veterans continues to be a high research priority. Our use of a person-centered analysis revealed three classes that demonstrated unique constellations of suicidal thoughts and self-injurious behaviors: a low class with little to no self-injury history; an STaB class who reported high levels of suicidal ideation, suicide attempts, and NSSI; and an ST class that endorsed selective suicidal ideation. The distribution of self-injurious thoughts and behaviors across these typologies is consistent with data showing suicidal ideation and attempts reflect different suicide-related processes (Nock et al., 2013). It is interesting that NSSI and suicide attempts formed a typology in this sample, given that NSSI has been found to co-vary with suicidal ideation in non-veteran samples (Dhingra, Boduszek, & Klonsky, 2016). However, this pattern is consistent with findings reported by Bryan & Bryan (2014) showing high rates of co-occurrence between NSSI and suicide attempts among veterans.

The recent revision to the DSM-5 diagnostic criteria of PTSD to include “reckless and self-destructive behavior” highlights the importance of considering how trauma can interface with engagement in harmful behaviors. Membership in the STaB class was positively associated with various indicators of impulsivity and risky behavior, emotional distress, and arousal. Of note, membership in the low-risk class was associated with fewer mood and anxiety symptoms, less trauma exposure, and more approach-related motivations for risky behaviors. This subtype may exemplify a more resilient response to trauma and stress that places individuals at decreased risk for suicidality. Membership in the STaB and ST classes was unrelated to the extent of trauma exposure, depression, or PTSD symp-
toms. This finding is somewhat surprising and suggests that current psychopathology symptoms are not especially informative for distinguishing groups of veterans with different constellations of self-injurious thoughts and behaviors. However, it is possible that the high saturation of internalizing symptoms, PTSD, and trauma exposure in our sample limited our ability to detect differences between the classes on these indicators.

We found that those in the STaB class reported a greater tendency to act impulsively when trying to avoid negative emotions than those in the other two classes did. It also reported higher overall levels of trait impulsivity and risky behaviors in the past month. Together, these results are consistent with previous work linking negative urgency to NSSI and suicide attempts (Anestis & Joiner, 2011; Anestis et al., 2013). Interestingly, the low group reported a greater tendency to engage in risky behavior when seeking pleasurable emotions than the other groups, as well as experiencing less emotional arousal when engaging in risky behavior. This pattern of findings extends previous research (Nock et al., 2018) by showing that the STaB and ST groups differed not only in terms of overall impulsivity, but also in the emotional context in which impulsivity occurs.

One interpretation of these findings may be that the STaB class represents a combined externalizing–internalizing subtype of suicidality that reported high rates of anhedonic depression but is distinguishable based on deficits in impulse control, in line with previous research indicating that externalizing tendencies are risk factors for suicide attempts (Nock, Hwang, Sampson, & Kessler, 2010; Verona, Sachs-Ericsson, & Joiner, 2004). Another possibility is that individuals in the STaB class may have certain personality characteristics, such as borderline personality disorder, that contribute to the tendency to engage in self-injurious behavior and risky behaviors for avoidance motivations. We did not measure personality disorder traits in this study; however, an assessment of personality dysfunction could reveal important clinical differences between the identified classes.

Limitations

The current study has several strengths including recruitment of a clinically relevant sample of trauma-exposed veterans, assessment of multiple facets of impulsivity, use of LPA to identify empirically derived subtypes, and a timely research question given the alarming suicide rate among veterans. Findings should be interpreted considering the study limitations. First, although representative of military populations, men were overrepresented in this sample. Second, temporal relationships cannot be inferred with cross-sectional data. Third, given the reliance on self-report measures, replicating results with diagnostic interviews would bolster our findings.

References


© 2019 Hogrefe Publishing

Crisis (2020), 41(4), 288–295


History

Received May 4, 2019
Revision received July 26, 2019
Accepted August 9, 2019
Published online December 20, 2019

ORCID

Nadia Bounoua
https://orcid.org/0000-0001-9310-3049

Nadia Bounoua
Department of Psychological and Brain Sciences
University of Delaware
108 Wolf Hall
Newark, DE 19176
USA
ribounoua@psych.udel.edu

Nadia Bounoua is a graduate student in the Department of Psychological and Brain Sciences at the University of Delaware, USA. Her research examines the interplay of environmental, neurobiological and affective mechanisms underlying risk-taking behaviors across the lifespan.

Dr. Jasmeet Hayes is Assistant Professor in the Psychology Department at the Ohio State University, USA. She completed her
PhD in Clinical Psychology (specialization in Neuropsychology) at the University of Arizona. As a licensed clinical psychologist, Dr. Hayes's clinical interests include neuropsychological assessment of traumatic brain injury and posttraumatic stress disorder.

Dr. Naomi Sadeh is Assistant Professor in the Department of Psychological and Brain Sciences at the University of Delaware, USA. She received her doctorate from the University of Illinois at Urbana-Champaign and completed a postdoctoral fellowship at the University of California, San Francisco. She is also a licensed clinical psychologist.