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Behavioral and emotional responses to interpersonal stress: A comparison of adolescents engaged in non-suicidal self-injury to adolescent suicide attempters

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ABSTRACT

Prominent theoretical models and existing data implicate interpersonal factors in the development and maintenance of suicidal behavior and non-suicidal self-injury (NSSI). However, no known study has yet used computerized behavioral tasks to objectively assess responses to interpersonal conflict/collaboration among teens engaged in NSSI or having made a suicide attempt. The current study, therefore, compared interpersonal functioning indexed by the *Prisoner's Dilemma* (PD) task among three mutually exclusive groups, adolescents (ages 13–17): engaged in NSSI only without history of a suicide attempt ($n=26$); who made a suicide attempt without history of NSSI ($n=26$); and typically developing controls ($n=26$). Participants also completed the *Interpersonal Sensitivity Measure* to assess their general sensitivity to/awareness of others' behaviors and feelings. No significant between-group differences were found in PD task performance; however, compared to typically developing control participants and those who had made a suicide attempt, the NSSI group reported significantly more stress during the task. Additionally, NSSI participants rated themselves as more interpersonally sensitive compared to both attempters and typically developing controls. Given the lack of knowledge about whether these groups either differentially activate the same circuitry during stressful interpersonal interactions or instead rely on alternative, compensatory circuits, future work using event-related functional magnetic resonance imaging is warranted.

1. Introduction

There a six-fold rise in the prevalence of suicide from childhood to the later teenage years, with suicide now the third leading cause of death among 10–24 year olds (Centers for Disease Control and Prevention and National Center for Injury Prevention and Control, 2012). Beyond deaths by suicide, nearly 16% of U.S. high school students report considering suicide during the past year, while 13% made a plan and 8% made a suicide attempt (Eaton et al., 2011).

Another form of self-injurious behavior (SIB; i.e., behaviors that are direct and deliberately cause self-harm) is non-suicidal self-injury (NSSI). NSSI—defined as the deliberate destruction of one's body in the absence of intent to die (e.g., cutting, burning, or hitting oneself)— is also particularly pertinent to adolescence, with typical onset between the ages of 12–14 years and prevalence estimates ranging from 15% to 45% among community and clinical teen samples (Briere and Gil, 1998; Nock et al., 2006; Jacobson and Gould, 2007; Lloyd-Richardson et al., 2007; Jacobson et al., 2008;).

To better understand SIB in adolescence, research has examined psychiatric profiles and correlates associated with NSSI and/or suicide attempts. For example, studies have shown high rates of Major Depressive Disorder (MDD), anxiety disorders, disruptive behavior disorders, and substance use disorders among teens who are either engaged in NSSI or had had a lifetime suicide attempt (Ghaziuddin et al., 2000; Nock et al., 2006; Jacobson et al., 2008). Moreover, suicidal ideation, hopelessness, impulsivity, childhood maltreatment, and high levels of interpersonal conflict are psychosocial risk factors common to both NSSI and suicide attempts (Baetens et al., 2011; Andover et al., 2012). Despite findings that highlight their similarities, NSSI and suicide attempts differ in important ways with regards to prevalence, frequency, lethality and intent (Hamza et al., 2012; Klonsky, May, and Glenn, 2013; Zetterqvist et al., 2013). Studies-to-date tend to compare teens engaged in comorbid NSSI and suicide to

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healthy controls or to those engaged in just one of the behaviors (e.g., NSSI+attempt vs. attempt only). Addressing this limitation by comparing homogeneous groups of adolescents engaged in either NSSI or who made a suicide attempt would allow for the identification of risk and protective factors unique to attempts and NSSI, facilitating the development of more targeted assessments and treatments for both behaviors. This is a particularly important endeavor given that, despite best current treatments, SIB continues to be a significant health concern among our youth. Moreover, understanding the ways in which NSSI and attempts differ, and the risk factors unique to NSSI especially, would be valuable in suicide prevention, as data highlights the 7-fold increased risk for suicide among individuals engaged in NSSI, despite controlling for depression, past attempts, and gender (Nock et al., 2006; Guan et al., 2012).

Existing theoretical models that explain the phenomena of suicide attempts and NSSI offer particularly useful guidance in selecting areas for study (King and Merchant, 2008; Messer and Fremouw, 2008). Prominent among the efforts to understand suicide is the *Interpersonal Theory of Suicide* (Joiner, 2005; Van Orden et al., 2008) in which risk is described as the convergence of two interpersonal constructs—specifically, thwarted belongingness (i.e., the sense of social disconnect or an unmet need to belong) and perceived burdensomeness (i.e., belief that one is a burden or liability on others)—with an acquired capability to engage in suicide. In addition, Nock and Prinstein (2004) provide a model of NSSI that highlights the potential social versus automatic (e.g., emotion regulation) functions of this form of SIB. That is, social-negative reinforcement suggests the use of NSSI to avoid or escape from interpersonal demands whereas social-positive reinforcement centers on the use of NSSI to get attention or something from others. Both models, along with other data, implicate interpersonal factors as important contributors to suicide attempts and NSSI (e.g., risk associated with family or peer conflict, Adrian et al., 2011; protective role of social support, Wichstrøm, 2009). However, no known studies have yet used behavioral tasks to objectively assess response to interpersonal stress among teenagers engaged in NSSI or who made a suicide attempt.

To address this gap, the goal of the current study was to compare interpersonal functioning as indexed by the Prisoner's Dilemma (PD) computerized behavioral task—despite this task not assessing directly the social-based factors outlined in either Joiner (2005) or Nock and Prinstein's (2004) models—among three mutually exclusive groups of adolescents: (1) those engaged in NSSI only, without lifetime history of a suicide attempt, (2) those who had made an attempt only, without lifetime history of NSSI, and (3) community-recruited, typically developing controls. The PD version used in the present study is a computerized behavioral task based upon the economic exchange literature. This instrument objectively assesses an individual's response to interpersonal cooperation and conflict (Rilling et al., 2002; King-Casas et al., 2005; Sally, 2013). Previously, McClure et al. (2007) found that anxious/depressed (A/D) teens were more likely than typically developing controls to demonstrate cooperative behavior subsequent to their opponent's cooperation, consistent with a sociotropic (i.e., needing positive social interactions) rather than an autonomous (i.e., needing independence) approach to interpersonal relations. Furthermore, they found that A/D girls, but not boys, reported more anger towards their opponent, in line with past work depicting sex differences among school-aged typically developing control participants (e.g., Rotenberg et al., 2004).

In addition to PD game performance variables, we compared the self-reported interpersonal sensitivity of the NSSI, suicide attempter, and typically developnig control groups. We hypothesized that youth who made an attempt or engaged in NSSI would: (a) report heightened sensitivity to interpersonal conflict (i.e., increased negative affect towards PD opponent, generally higher sensitivity in interpersonal interactions beyond PD performance) compared to typically developing control participants, and (b) demonstrate more cooperative (i.e., conflict avoidant) responses to opponent cooperation compared to typically developing control participants. No a priori hypotheses were made about self-report or behavioral differences between the suicide attempter and NSSI groups because findings support the role of interpersonal factors in the development of both patterns of behavior.

2. Methods

2.1. Participants

All participants were enrolled in an Institutional Review Board-approved research study conducted at a psychiatric facility in the Northeast. Specifically, adolescents (ages 13–17 years) were enrolled in one of the following mutually exclusive groups: (1) psychiatric inpatients presenting with a recent suicide attempt; (2) psychiatric inpatients presenting with recent NSSI; and (3) community-based, typically developing controls. The rationale for enrolling inpatient participants was to study responses to interpersonal cooperation/conflict in closest temporal proximity to their index SIB, as well as to ensure comparable levels of functional impairment, i.e., *Children's Global Assessment Scale* (Shaffer et al., 1983) scores <40 required for admission. This way, potential selection bias inherent in comparing groups across psychiatric service settings (i.e., comparing outpatients engaged in NSSI to inpatients who made an attempt) could be avoided. Adolescents who engaged in both NSSI and made a suicide attempt were excluded from this study because we sought to evaluate the unique association of these behaviors with responses to interpersonal conflict.

Suicide attempt participant ($n=26$) inclusion criteria were: (1) having attempted suicide within the past 30 days and (2) no lifetime history of NSSI. An attempt was defined as an action, regardless of resulting self-injury, completed with some intent to die (Bridge et al., 2006). Intent was evaluated using the adolescent's self-report and/or inference from the suicide attempt lethality (Silverman et al., 2007).

NSSI participant ($n=26$) inclusion criteria were: (1) had engaged in NSSI, defined as the purposeful destruction of one's body tissue without the intent to die (Nock et al., 2006), at least five days within the past year (and at least one in the past 30 days); thus meeting the DSM-5 (American Psychiatric Association, 2013) criteria for NSSI Disorder ("a condition for further study") and (2) had a negative lifetime history of suicide.

Typically developing control participant ($n=26$) inclusion criteria were (1) no current or lifetime psychiatric illness or substance abuse/dependence in themselves and (2) no report of psychiatric illness in their first-degree relatives.

Exclusion criteria for all groups were limited English fluency, low cognitive function (i.e., Full Scale IQ$\leq$70 on the Wechsler Abbreviated Scale of Intelligence [WASI]; Psychological Corporation, 2013), and current psychosis—as these factors might interfere with a participant's understanding of study assessments. Adolescents with an autism spectrum disorder (ASD) diagnosis were also excluded, given literature suggesting that SIB in children with ASD may represent a distinct entity (Duerden et al., 2012).

2.2. Procedure

NSSI and suicide attempt group recruitment started with daily chart review of new psychiatric admissions. Research staff contacted parents of eligible youths to schedule an in-person meeting to further describe the study to them and the potential participant. Typically developing control participants were recruited from the community through advertisements distributed to physicians' offices and local businesses. Interested families called the research program to schedule a meeting to discuss study details. Demographic characteristics by group are provided in Table 2.

After informed consent and assent were obtained, participants were interviewed about SIB and lifetime psychiatric functioning to confirm their research group status. Participants continuing to meet inclusion criteria were administered the WASI (Psychological Corporation, 2013), a diagnostic interview, filled out self-report forms, and completed behavioral tasks. Parents separately completed questionnaires regarding their adolescents' functioning. Participants were compensated for their time.

2.3. Measures

The current study incorporated multiple measures focused on adolescents' psychopathology, SIB, and interpersonal functioning.

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