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The mediating role of non-suicidal self-injury in the relationship between impulsivity and suicidal behavior among inpatients receiving treatment for substance use disorders

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ABSTRACT

Several theories posit a direct role of impulsivity in suicidal behavior. The interpersonal-psychological theory of suicidal behavior (IPTS) argues that the relationship between impulsivity and suicidal behavior is explained by the painful and/or provocative experiences (PPEs) often encountered by impulsive individuals. It thus seems plausible that nonsuicidal self-injury (NSSI), itself associated with impulsivity, might account for the relationship between impulsivity and suicidal behavior. We examined data from 93 adult inpatients (54.8% male) seeking treatment for substance use disorders. Patients completed a structured interview assessing prior suicidal behavior and a series of self-report questionnaires examining impulsivity, NSSI, and psychopathology. Four impulsivity dimensions (negative urgency, positive urgency, lack of premeditation, lack of perseverance) were associated with lifetime number of suicide attempts and/or suicide potential. Furthermore, results supported our hypotheses, as all but one relation was better accounted for by NSSI and, in the one exception, the direct effect was non-significant. Findings are consistent with the IPTS and suggest that suicidal behavior may not be a direct manifestation of impulsivity, but facilitated through exposure to PPEs capable of altering an individual's relationship to pain and fear of death.

1. Introduction

A number of theorists have proposed a prominent role of impulsivity in suicidal behavior. For instance, Baumeister (1990) proposed that impulsive individuals are prone to rashly engaging in suicidal behavior in an effort to escape aversive self-awareness resulting from acute stress. Thus, this theory posits a direct and proximal role of impulsivity in suicidal behavior. Other theories have proposed a multifaceted relationship, with impulsivity demonstrating both distal and proximal associations with suicidal behavior. For example, Mann et al. (1999) proposed that impulsivity serves as the diathesis in a diathesis-stress model. In their conceptualization, immediate stressors (e.g., negative life events) trigger suicidal ideation and increase the risk for rash suicidal behavior among individuals exhibiting this diathesis (i.e., high levels of trait impulsivity). Although this theory also acknowledges the impact of a lifetime of impulsive behaviors on other vulnerabilities (e.g., by increasing exposure to events likely to prompt suicidal ideation), the direct and proximal role of impulsivity in suicidal behavior remains a pivotal aspect of this model. In contrast, the interpersonal-psychological theory of suicidal behavior (IPTS; Joiner, 2005) proposes a distal and indirect role of impulsivity in suicidal behavior. According to the IPTS, impulsive individuals encounter a greater number of painful and/or provocative events (PPEs) over the course of a lifetime. This exposure to PPEs then increases an individual's acquired capability for suicide (defined as an enhanced tolerance of physiological pain and a diminished fear of death and/or bodily harm), thereby facilitating suicidal behavior in the presence of suicidal desire independent of impulsivity itself. Indeed, the IPTS posits that the pain and affective discomfort involved in suicidal behavior renders impulsive efforts at lethal self-harm highly unlikely if not impossible.

Data consistent with the IPTS conceptualization of the relation between impulsivity and suicidal behavior have emerged from multiple sources. Several studies examining the relationship between trait impulsivity and characteristics of specific suicide

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attempts have found that impulsive individuals tend to endorse a *greater* level of planning prior to attempts (e.g., de Leo et al., 2005; Witte et al., 2008; Wojnar et al., 2009); others have found no relationship between trait impulsivity and the level of planning involved in specific attempts (e.g., Baca-Garcia et al., 2005; Nakagawa et al., 2009). Findings that trait impulsivity is either unrelated to or inversely associated with levels of planning of specific acts of suicidal behavior are problematic for models conceptualizing trait impulsivity as a proximal and direct risk factor for suicide attempts. Likewise, although one study did find a significant and positive association between trait impulsivity and attempt lethality (e.g., Chesin et al., 2010), this study did not examine potential mediators (e.g., PPEs). Moreover, studies examining the level of planning involved in specific attempts have demonstrated a consistent (albeit not universal) inverse association between attempt impulsivity and attempt lethality (e.g., Baca-Garcia et al., 2001; Connor et al., 2006; Witte et al., 2008; Nakagawa et al., 2009; see Brown et al., 1991 for conflicting results). For example, in a sample of 83 older adult inpatients, Dombrovski et al. (2011) found that individuals with a history of suicide attempts who were *better* able to delay reward reported greater attempt lethality. Likewise, in a sample of 273 inpatient attempters, Monnin et al. (2012) found that violent suicide attempts were associated with less cognitive impulsivity than were nonviolent attempts. Together, the results of these studies suggest that a certain level of planning and/or mental preparation may be necessary to overcome the pain and fear associated with suicidal behavior (an inherently painful and frightening experience). Indeed, these findings suggest that impulsivity may serve as an obstacle to suicidal behavior with a higher likelihood of death.

The most direct support for the IPTS conceptualization of the relationship between impulsivity and suicidal behavior comes from a growing body of research examining the potential mediating role of PPEs in this association. In a sample of 182 undergraduates, Bender et al. (2011) found that the relationship between trait impulsivity (Barratt Impulsiveness Scale; Patton et al., 1995) and the acquired capability was mediated by lifetime exposure to PPEs. Similarly, in a separate sample of 516 adult outpatients, Bender et al. (2011) found that the associations between the different impulsivity constructs measured in the original UPPS Impulsive Behavior Scale (negative urgency, sensation seeking, lack of premeditation, and lack of perseverance; Whiteside and Lynam, 2001) and the acquired capability were mediated by lifetime exposure to PPEs. Although consistent with the IPTS, these studies did not consider suicidal behavior per se. Providing more direct support for the IPTS, however, Anestis et al. (2012) found that the relationship between one facet of impulsivity (negative urgency) and suicidal behavior in a sample of 358 adult outpatients was mediated by lifetime number of PPEs.

Although these results are promising, a pivotal question to consider within the context of extant research is the degree to which specific forms of pain and provocation may impact vulnerability for suicidal behavior more directly. The IPTS proposes that intentional self-inflicted injury (regardless of suicidal intent) may be a particularly relevant PPE with a robust association with the acquired capability for suicide. Specifically, not only does intentional self-injury (both suicidal and non-suicidal) alter an individual's relationship with pain, it also influences an individual's fear of death and severe bodily harm (Joiner, 2005; Van Orden et al., 2010). For instance, Klonsky et al. (2013) found that nonsuicidal self-injury (NSSI) exhibited a robust association with suicide attempts within both clinical and nonclinical samples. Moreover, the association between NSSI and suicide attempts was stronger than the association between impulsivity and suicide attempts.

Given the previously established associations between both impulsivity and NSSI (e.g., Glenn and Klonsky, 2010) and NSSI and suicidal behavior (e.g., Klonsky et al., 2013), a valuable next step in testing the veracity of the IPTS framework is to examine the explanatory role of NSSI in the association between multiple dimensions of impulsivity and suicidal behavior. To this end, we recruited a sample of 93 adult inpatients seeking treatment for substance use disorders (SUDs), a population shown to have elevated rates of impulsivity (Stoltenberg et al., 2011), NSSI (e.g., Evren and Evrens, 2005; Oyefeso et al., 2008; Gratz and Tull, 2010), and suicidal behavior (e.g., Bornovalova et al., 2011). Patients were administered a structured interview assessing lifetime experiences with suicidal behavior, as well as a series of questionnaires assessing impulsivity, NSSI, and psychopathology. We hypothesized that NSSI would account for the associations between dimensions of impulsivity (i.e., negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking) and both suicide attempts and suicide potential (a behaviorally-focused continuum of severity and risk of death ranging from no suicidal behavior to low lethality suicidal behavior to high lethality suicidal behavior; Anestis et al., 2013). Findings in support of our proposed model would represent a challenge to theories positing a direct and proximal role of impulsivity in suicidal behavior. Such findings would highlight the importance of a particular type of PPE (NSSI) in the observed relation between impulsivity and suicidal behavior, thereby suggesting the utility of interventions focused on decreasing PPEs among impulsive patient populations.

2. Method

2.1. Participants

This sample consisted of 93 adults (55% male) seeking residential treatment for substance use disorders in central Mississippi. Participants ranged in age from 18 to 62 years ($M=36.25$, S.D.$=11.45$). The ethnic composition of the sample was 76.3% White, 16.1% African American, 3.2% Asian/Asian–American, and 2.2% Latino/a. Participants were predominately single (68.8%) and unemployed (57.0%). With regard to educational attainment, 10.9% of the participants reported not completing high school, 33.4% reported completing high school or receiving a GED, 32.3% reported completing some college, and 19.3% reported graduating college. Fifty percent of the sample reported a total annual family income of less than $10,000, 28.6% reported an annual income between $10,000 and $29,000, and 22.0% reported am annual income of $30,000 or greater. Diagnostic data were not collected as part of the current study; however, clinical data from this facility indicate that the majority (approximately 60%) of patients meet criteria for alcohol and/or cocaine dependence. Furthermore, psychiatric comorbidity is common among patients, with approximately 25% meeting criteria for a mood disorder and 60% meeting criteria for an anxiety disorder.

2.2. Measures

2.2.1. Structured interview

The Lifetime Suicide Attempts Self-Injury Interview (L-SASI; Linehan and Comtois, 1996) is a structured interview that assesses lifetime episodes of NSSI and suicidal behavior. For each episode of each behavior, the L-SASI assesses participants' intent to die (none, clear, or ambivalent), type of medical attention received (if applicable), and level of lethality. No psychometric studies pertaining to the L-SASI have been performed; however, the items comprising the L-SASI are drawn from the Suicide Attempt Self-Injury Interview (SASII; Linehan et al., 2006), which has been found to demonstrate high inter-rater reliability and adequate validity (e.g., Pistorello et al., 2012). Based on the responses to this interview, three suicide-related outcome variables (i.e., lifetime number of suicide attempts with clear intent to die, lifetime number of suicide attempts with clear or ambivalent intent to die, and suicide potential) were calculated and examined as outcome variables in primary analyses. Specifically, the first of these outcomes focused on suicide attempts and included only suicide attempts with clear intent to die. This was done to maximize specificity relative to NSSI (i.e., self-injurious behavior with no intent to die). The second suicide-related outcome variable also focused on suicide attempts, but included suicide attempts with any (non-zero) level of suicidal intent (i.e., clear or ambivalent intent to die). This was done to maximize the generalizability of the proposed model across varying levels of suicidal intent. Finally, the third outcome variable focused on suicide potential, and was calculated based on L-SASI lethality ratings of past suicide attempts. Specifically, the L-SASI lethality protocol includes a scoring system ranging from 1 (very low; e.g., "less

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