



Research paper

Functional domains as correlates of suicidality among psychiatric inpatients

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ABSTRACT

Background: Suicide remains poorly understood and unpredictable. Addressing this challenge, this study examined the independent contributions of several research domain criteria (RDoC) constructs in relation to suicidality in patients hospitalized for acute suicide risk. Specifically, we examined anhedonia, anxiety/entrapment, and attachment disturbances, reflecting disturbances in reward processes, negative valence systems, and social processes, respectively.

Methods: Anhedonia, anxiety, entrapment, and fearful attachment, were assessed quantitatively in 135 adults hospitalized for suicidality. Current suicidality and suicidal history were assessed with the Columbia Suicide Severity Rating Scale. Bivariate analyses (with significance threshold of $p < .01$ to account for multiple comparisons) and multivariate models examined relationships between symptom dimensions and severity of suicidal ideation (SI). We also assessed differences between patients with a history of suicide attempt and those who exhibited only suicidal ideations.

Results: Using bivariate analyses all symptoms except for fearful attachment correlated robustly with SI ($r = .37$ – 0.50 , $p < .001$). However, when using multivariate analyses, only anhedonia ($\beta = .28$, $p = .01$) and entrapment ($\beta = .19$, $p = .03$) were independently associated with SI across the entire sample. No functional domain measures differed between patients with history of suicide attempt versus ideation only.

Limitations: The reliance on self-report data and a cross-sectional design.

Conclusions: Disturbances in reward and threat processing may represent independent factors in the development of suicidal ideation in this high suicide risk cohort. Future studies should assess their role as risk factors.

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1. Introduction

Suicide is a major public health concern ranking as the second leading cause of death among individuals ages 10–34 in the United States (CDC, 2015) and, globally, accounts for over 800,000 deaths each year (WHO, 2014). Despite ongoing efforts, suicide prevalence remains high and clinically challenging to predict (Turecki and Brent, 2016). The most prominent risk factors are prior suicide attempts (SA; Joiner et al., 2005) and the presence of a psychiatric condition, with mood disorders among those conferring highest risk (Harris and Barraclough, 1997). The observation that any psychiatric condition can be associated with suicide risk is most likely due to the nature of our classification system for psychiatric conditions, which categorizes disorders based on clusters of

symptoms that overlap across disorders. Addressing this challenge, the Research Domain Criteria (RDoC) project was launched where systems based on cognitive, behavioral and neuronal mechanisms are the focus of investigation rather than a DSM classified psychiatric disorder (Cuthbert, 2015). Relatedly, several suicide studies from our laboratory and others have examined specific symptoms that reflect corresponding disturbances in functional domains, such as anhedonia (Bradley et al., 2015; Fawcett et al., 1990; Gabbay et al., 2015; Kollias et al., 2008; Nock and Kazdin, 2002; Spijker et al., 2010; Winer et al., 2014), anxiety/entrapment (Goldston et al., 1996, 2006; Hendin et al., 2010; O'Connor et al., 2013; Ohring et al., 1996; Panagioti et al., 2012; Sareen et al., 2005a, 2005b; Yaseen et al., 2012, 2014), and attachment disturbances (Adam et al., 1996; Grunebaum et al., 2010; Lessard and Moretti, 1998; Lizardi et al., 2011; Palitsky et al., 2013). In particular, anhedonia reflects disturbance in reward processing including reward motivation (Auerbach et al., 2015; Gold et al., 2013), attainment (Liu et al., 2016), and learning (Pizzagalli et al., 2008, 2005); entrapment reflects response to acute threat in the

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context of frustrative nonreward (Gilbert and Allan, 1998); state and trait anxiety reflect acute sensitivity to and chronic vigilance for threat, respectively (Bishop, 2009; Jusyte et al., 2015); finally, fearful attachment represents disturbance in the social systems involved in affiliation (Safran, 1990; Yaseen et al., 2016). However, many of these investigations assessed these symptoms categorically and/or were limited to one psychiatric condition (e.g. major depression, bipolar disorder, eating disorder, posttraumatic stress disorder). In addition, only a few studies involved an actively suicidal psychiatric group.

Another notable limitation concerns the study of distinct symptoms in isolation, as done in most investigations to date, versus concurrently. Such work can better distinguish the significant correlates for suicide since different functional domains often influence one another. Only a few studies carried out such an approach. For example, in a large, two-wave general population study, Spijker et al. (2010) reported that when entered together in one model, categorical indices of anxiety and anhedonia each contributed independently to the prospective risk for suicidality. Another study that assessed 103 patients who were hospitalized following a suicide attempt, reported that the relationship between feelings of defeat and the severity of suicidal ideation was mediated by entrapment—the perception of being trapped and unable to escape from a stressful situation (Rasmussen et al., 2010); this was true even after controlling for depression and anxiety severity. In this same study, positive future thinking moderated the relationship between entrapment and suicidal ideation. These findings support our view that several dimensions may synergistically influence suicide risk.

Building upon these above observations, the current study sought to investigate several RDoC based constructs, assessed quantitatively, in concert, in relation to suicidality in patients hospitalized for acute suicide risk. Specifically, our aims were to examine simultaneously the relationships between suicide severity and disturbances in: a) reward processes/positive valence systems, as reflected by anhedonia; b) negative valence systems manifested as state/trait anxiety and entrapment; and c) social processes as indexed by fearful attachment. As presented above, we selected these particular correlates in light of the extensive evidence implicating each of these functions in suicidality separately, their critical role in day-to-day adaptation, their inter-related function, and our previous work. We hypothesized that each symptom would correlate with severity of suicidal ideation in univariate analyses. Further, we hypothesized that symptoms would contribute independently to the severity of suicidal ideation in multivariate analyses. Finally, we explored whether these clinical correlates differed between patients who had a history of suicide attempt compared to those without a history of suicide attempt. Our expectation was that symptoms in these domains would be more severe in the suicide attempter subgroup.

2. Methods

2.1. Participants and consent procedures

Participants were 135 adults hospitalized for suicidality. A full sample of 170 individuals were initially recruited at the Mount Sinai Beth Israel Hospital (MSBI) in New York City from 4/8/13–2/12/15, after presenting to the Emergency Room with a suicide attempt or with high suicidal risk necessitating hospitalization. Exclusionary criteria included homelessness, lack of collateral contacts, inability to understand the consent or research questions (e.g., due to mental retardation, cognitive impairment, or linguistic limitation), the presence of significant medical or neurological disease, possible delirium, or behavioral impairment that might

interfere with participation. Of those recruited, 152 (89%) provided complete data and were included in the initial analysis. Seventeen subjects denied any past month suicidal ideation and were therefore excluded from further analysis, resulting in a final sample of 135 subjects.

Within 48 h of admission, potential participants were approached and informed about the study. Those willing and able to provide informed consent were administered the study battery. The informed consent included permission to review the patient's medical record on the unit and to contact the patient in the future for follow-up assessment. Subjects were compensated \$20 for their participation. The Mount Sinai Beth Israel institutional review board approved the study and procedures for obtaining informed consent.

2.2. Measures

The study team interviewed participants and administered a psychological test battery including measures of suicidal ideation, anhedonia, entrapment, state and trait anxiety, and attachment style within 48 h of admission.

Suicidal ideation and behavior was assessed with the Columbia Suicide-Severity Rating Scale (C-SSRS; Posner et al., 2011). The C-SSRS is a structured clinical interview with scoring for level and intensity of suicidal ideation and behaviors. This instrument is currently considered a gold standard for assessing suicidality and is mandated by the FDA to be used in all clinical trials where suicide is assessed. Trained research assistants administered the C-SSRS, and the author ZSY supervised the scoring. From the C-SSRS, we extracted a measure of peak severity of suicidal ideation (SI) in the month prior to assessment, and used this as our outcome measure. Peak severity was defined as the sum of the 1 through 5 point scores on the following C-SSRS items: Intensity (level of planning and intent), Frequency, Duration, and Controllability of SI, and Deterrents to suicide (lower score for higher levels of deterrence), plus five additional points for the presence of "Preparatory acts or behavior" that "include anything beyond a verbalization or thought, such as assembling a specific method (e.g., buying pills, purchasing a gun) or preparing for one's death by suicide (e.g., giving things away, writing a suicide note)" but which "fall short of initiating action that would be the proximal cause of death (taking pills, shooting self, *et cetera*)". Cronbach's alpha on the study sample was .61. Patients were classified as suicide attempters (SA subgroup) if they had any lifetime actual suicide attempts as defined by the C-SSRS: "potentially self-injurious acts committed with at least some wish to die as a result."

As a supplementary measure of suicidal ideation severity, the self-report Beck Scale for Suicidal Ideation (BSS) which captures past week suicidality was used (Beck and Steer, 1991). Cronbach's alpha on the study sample was .86.

2.3. Anhedonia

Participants completed the self-report Beck Depression Inventory II (BDI; Beck et al., 1996; Steer et al., 2001). An anhedonia score was extracted from the BDI by summing the score on items 4 (loss of pleasure) and 12 (loss of interest in social relations). This approach to quantifying anhedonia has been used in our own as well as others' investigations (Gabbay et al., 2012; Gabbay, 2013; Henderson et al., 2013; McMakin et al., 2012). Cronbach's alpha on the study sample was .66. In addition, as a control for global depression severity, we calculated the BDI total score excluding anhedonia (items 4 and 12) and suicidal ideation (item 9).

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