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Research paper

Trait liabilities and specific promotive processes in psychopathology: The example of suicidal behavior

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ABSTRACT

Background: The RDoC matrix framework calls for investigation of mental health problems through analysis of core biobehavioral processes quantified and studied across multiple domains of measurement. Critics have raised concerns about RDoC, including overemphasis on biological concepts/measures and disregard for the principle of multifinality, which holds that identical biological predispositions can give rise to differing behavioral outcomes. The current work illustrates an ontogenetic process approach to addressing these concerns, focusing on biobehavioral traits corresponding to RDoC constructs as predictors, and suicidal behavior as the outcome variable.

Method: Data were collected from a young adult sample (N=105), preselected to enhance rates of suicidality. Participants completed self-report measures of traits (threat sensitivity, response inhibition) and suicide-specific processes.

Results: We show that previously reported associations for traits of threat sensitivity and weak inhibitory control with suicidal behavior are mediated by more specific suicide-promoting processes—namely, thwarted belongingness, perceived burdensomeness, and capability for suicide.

Limitations: The sample was relatively small and the data were cross-sectional, limiting conclusions that can be drawn from the mediation analyses.

Conclusions: Given prior research documenting neurophysiological as well as psychological bases to these trait dispositions, the current work sets the stage for an intensive RDoC-oriented investigation of suicidal tendencies in which both traits and suicide-promoting processes are quantified using indicators from different domains of measurement. More broadly, this work illustrates how an RDoC research approach can contribute to a nuanced understanding of specific clinical problems, through consideration of how general biobehavioral liabilities interface with distinct problem-promoting processes.

1. Introduction

The Research Domain Criteria (RDoC) matrix system was introduced in 2012 as an impetus and concrete point of reference for improving integration of biobehavioral concepts and measures into mental health research and practice (Morris and Cuthbert, 2012). Critics have argued (e.g., Lilienfeld, 2014) that the RDoC framework may be overly reductionistic and not adequately considerate of the principle of multifinality, which holds that identical biological predispositions can be expressed in markedly different ways. In the current paper, we focus on the topic of suicidal behavior to illustrate how basic biobehavioral constructs from the RDoC framework that are generally relevant to psychopathology (i.e., transdiagnostic) can help inform our understanding of specific clinical problems. In doing so, we highlight an ontogenetic process perspective (Patrick and Hajcak, 2016; see also Durbin and Hicks, 2014), which views clinical problems as outcomes of general transdiagnostic liabilities that contribute, in concert with developmental transitions and experiential factors, to the emergence of specific problem-promoting processes.

The RDoC initiative encourages a focus on specific clinical-problem phenomena that can be characterized dimensionally (e.g., anhedonic mood, sleep disturbance, ruminative thinking) in place of diagnostic categories that are defined using arbitrary criteria, clouded by issues of comorbidity, and not easily relatable to biological systems and processes (Kozak and Cuthbert, 2016). Suicidal behavior is a distinct clinical problem that can be conceptualized in dimensional terms. Lethal suicide attempts, while rare, have antecedents that are far more common: In the vast majority of cases, the presence of suicidal

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ideation, progressing to active intent and planning, precedes active attempts to take one's life (Van Orden et al., 2012). Thus, suicidality can be viewed as a continuum ranging from passive ideation about death, to active suicidal desire, to general planning for suicide, to specific preparations for taking one's life, to non-lethal or lethal suicide attempts (Drum et al., 2009). Systematic research has identified a number of proximal and distal risk factors for suicidal behavior (Nock and Kessler, 2006). While proximal risk factors aid in detecting individuals at imminent risk for suicidal behavior, knowledge of distal risk factors enhances our ability to identify persons at risk for suicide in the longer term. Thus, an approach that focuses on general biobehavioral tendencies that predispose individuals to develop specific suicidogenic states across time is likely to be crucial for identifying high-risk candidates for suicide prevention programs before permanently damaging or lethal self-harm occurs.

1.1. Dispositional Factors in Suicidality

Considerable evidence points to a role for dispositional risk factors in suicidal behavior. Specifically, family studies indicate increased risk for suicidal tendencies among relatives of suicide completers even after controlling for the presence of shared psychiatric disorders (Brent and Mann, 2005). Similarly, twin and adoption studies have documented an appreciable contribution of genetic influences to suicidal behavior (Brent and Mann, 2005; Bondy et al., 2006; Statham et al., 1998), When suicidality is defined to include behavioral antecedents such as ideation, plans, and attempts, heritability estimates range from 30% to 50% (Brezo et al., 2008), with estimates even higher for death by suicide in comparison to estimates for ideation and non-fatal attempts (Mann et al., 2009).

Recent research on risk for suicidal behavior has focused on two specific constructs from the RDoC matrix system, framed in trait-dispositional terms (Yancey et al., 2016): acute threat or “fear,” from the Negative Valence Systems domain, and response inhibition, from the Cognitive Systems domain. Framed in dispositional terms—i.e., as threat sensitivity (THT) and weak inhibitory control (or disinhibition; DIS)—these constructs connect to personality trait variables known to predict suicide proneness. THT relates to the broad personality dimension of negative emotionality (NE) or neuroticism, which has been conceptualized as reflecting sensitivity to aversive events and experiences (Tellegen, 1985). However, THT is narrower in scope than NE, referring specifically to proneness to react with defensive (fear) activation to immediately threatening stimuli or situations (Kramer et al., 2012; Patrick and Bernat, 2010)—and can be operationalized using psychological scales combined with physiological response measures (Vaidyanathan et al., 2009; Yancey et al., 2016). DIS relates to the personality dimension of constraint versus impulsiveness, theorized to involve variations in regulatory control or executive function (Barkley, 1997; Rothbart et al., 2003). When assessed as scores on the common factor underlying externalizing problems and impulsive traits, DIS shows reliable associations with brain measures of cognitive-attentional processing (Nelson et al., 2011; Yancey et al., 2013) and task-behavioral measures of executive control (Young et al., 2009).

Recent research demonstrates that elevations on THT and DIS are associated with increased suicide risk in clinic, military, and general community samples. Venables et al. (2015) found in two large samples (*N*s=1078 and 3855) that these biobehavioral traits each related uniquely to suicide risk, accounting for separate portions of variance in a composite measure of suicidality, and also interactively, such that individuals high on both traits showed the highest risk for suicidal behavior. Moreover, in line with RDoC's emphasis on multi-domain assessment, Venables et al. (2016) demonstrated in a separate follow-up sample (*N*=444) that “psychoneurometric” operationalizations of THT and DIS that incorporated neurophysiological indicators together with self-report measures also evidenced unique as well as interactive relations with suicide risk.

These findings suggest that the presence of both traits may confer a distinct liability to suicide and affiliated psychological processes. These findings also dovetail with research showing high rates of suicidal behavior in individuals with borderline personality disorder, a condition that includes impulsive-aggressive tendencies along with high negative affectivity (Brown et al., 2002). However, THT and DIS are known to increase risk for clinical problems of many different types (Nelson et al., 2016; Venables et al., in press), and the mechanisms by which these traits contribute specifically to risk for suicidal behavior remain unclear. To clarify possible mediating mechanisms, we turn to a prominent model of suicidal behavior: the interpersonal theory of suicide (ITS; Joiner, 2005; Van Orden et al., 2010).

1.2. Theoretical Model of Suicide Processes

The ITS model posits that suicidal ideation arises when an individual's need for social connectedness is blocked or impeded (*thwarted belongingness*) and the individual feels overly reliant/demanding on others (*perceived burdensomeness*). Furthermore, the model specifies that suicidal ideation is likely to progress toward active desire for death as these interpersonal states persist, and hopelessness mounts that they will continue across time (Van Orden et al., 2010). Additionally, the model posits a third process, *capability for suicide* (or acquired capability; Van Orden et al., 2010), that contributes critically to the progression from ideation to enactment. This capability factor is theorized to involve fearlessness about death (i.e., nullification or suppression of the instinctual fear of dying) along with increased tolerance for pain (Ribeiro et al., 2014), and is presumed to arise from influences separate from those that engender thwarted belongingness and perceived burdensomeness. When it occurs together with these two interpersonal states (especially when persistent), the presence of capability opens the door to suicidal action. That is, it contributes in a synergistic, interactive manner to suicidal action (Van Orden et al., 2010).

The ITS model has been a prominent focus of research since it was proposed and considerable support has emerged for its major tenets (Ribeiro and Joiner, 2009). The model is process-oriented and specific to suicide. It conceives of hopelessness arising from persistent feelings of social estrangement and overreliance on others along with reduced fear of death as combining to form a distinct suicidogenic state. As such, the ITS model provides a potentially valuable point of reference for clarifying how biobehavioral dispositions corresponding to RDoC constructs contribute to this devastating clinical problem.

1.3. Current study aims and hypotheses

The present study sought to extend prior work documenting replicable predictive relations for RDoC trait constructs of THT and DIS with suicidal behavior (Venables et al., 2015, 2016) by examining whether the basis of these associations lies in the effects of these traits on specific promotive processes that are psychologically more proximal to suicidal behavior. Our broader aim was to illustrate an ontogenetic process approach to RDoC-oriented research (Patrick and Hajcak, 2016), in which the contributions of broad biobehavioral liabilities to distinct clinical outcomes are clarified by investigating how they interface with specific problem-promoting processes.

More specifically, we undertook analyses of data for the two RDoC traits of interest (THT, DIS) along with measures of the three ITS process constructs (thwarted belongingness, perceived burdensomeness, capability for suicide) in a sample prescreened to provide over-representation of suicidal tendencies ranging from ideation to actual attempts. We used standard correlational techniques (simple *r*s, multiple regression) to investigate relations of traits and ITS processes with each other, and in turn with suicidality. In addition, we utilized mediational analyses to test our major *a priori* hypotheses—namely,