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Restrictive eating: Associated with suicide attempts, but not acquired capability in residential patients with eating disorders

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1. Introduction

Individuals with anorexia nervosa (AN) have a markedly elevated risk for fatal suicide attempts compared to both the general population and those with other eating disorders (Preti et al., 2011). In addition, the non-fatal suicide attempts of individuals with AN are characterized by greater intent and lethality than those made by individuals with other mental disorders, including bulimia nervosa (BN; Guillaume et al., 2011). The interpersonal-psychological theory of suicide (Joiner, 2005; VanOrden et al., 2010) is one theoretical model that may explain why people with AN are at greater risk for suicide even compared to those with other eating disorders. This theory asserts that desire for suicide alone is not sufficient to result in fatal suicidal behavior. Rather, an individual must have acquired the capability for suicide (i.e., have the requisite pain tolerance and fearlessness about death necessary to endure lethal self-harm) in order to make a fatal suicide attempt. According to the interpersonal-psychological theory of suicide, this capability can be acquired through exposure to life events that result in habituation to the pain and fear involved in self-injury. In the first published articulation of the interpersonal-psychological theory of suicide, Joiner (2005) highlighted extreme restrictive eating as a painful and provocative experience that could result in acquiring the capability for suicide. Although Joiner (2005) acknowledged other types of eating disorder behaviors (e.g., bingeing, vomiting) as possible contributors to the acquired capability for suicide, he hypothesized that extreme restrictive eating, which distinguishes AN from other eating disorders, may be particularly useful in explaining why people with AN engage in more lethal suicidal behavior even compared to those with BN.

Although support for Joiner's hypothesis that restrictive eating facilitates the acquired capability for suicide can be drawn from a variety of existing studies, no studies to date have comprehensively tested this hypothesis in a clinical sample. For example, while there is a robust literature establishing that individuals with AN have an elevated pain tolerance as compared to healthy controls (e.g., Claes et al., 2006; Lautenbacher et al., 1990; Papezová et al., 2005; Raymond et al., 1999), these studies did not focus on restrictive eating as the explanation for this difference. In several studies designed to test Joiner's restrictive eating hypothesis more directly (e.g., Holm-Denoma et al., 2008; Selby et al., 2010; Witte et al., 2012) results have generally been supportive; however, none of these studies used comprehensive measures to assess restrictive eating or either component of the acquired capability for suicide. To date, the one study that examined both pain tolerance and fearlessness about death in relation to restrictive eating did not find an association (Zuromski and Witte, 2015); however, this study's conclusions were limited by the use of a subclinical sample. In the current study, we addressed the limitations of prior research to test the hypothesis that restrictive eating is associated with acquired capability for suicide. Specifically, if restrictive eating accounts for the elevated suicide risk in AN compared to other eating disorders, restrictive eating should be more strongly associated with suicide attempts and acquired capability for suicide compared to non-restrictive eating disorder behaviors.

To test our hypothesis, we operationalized restrictive eating in several ways, which included a) a diagnosis of AN versus other

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eating disorders, b) frequency of fasting over the past month, c) dietary restraint, which is the desire to restrict caloric intake, and d) body mass index (BMI), which is an indicator of the degree to which a person has engaged in severe restrictive eating. We hypothesized that 1) each restrictive eating variable would be associated with past suicide attempts, 2) each restrictive eating variable would be associated with both facets of acquired capability for suicide (i.e., pain tolerance and fearlessness about death), and 3) although there would be positive associations between non-restrictive eating disorder variables (i.e., bingeing, vomiting, laxative use, excessive exercise) and suicide attempts and acquired capability, the associations would be stronger for restrictive eating variables.

2. Methods

2.1. Participants and procedure

Participants were adult, female patients receiving treatment at a residential eating disorder treatment center in the southeastern United States ($N = 100$). During intake, which occurred on the first day patients arrived at the treatment center, a clinician provided a detailed description of the research study to patients, and those who chose to participate signed a consent form. Although precise data on the rate of participation are not available, the vast majority of patients agreed to participate in the study (i.e., upwards of 85%). Participants completed a battery of computer-administered questionnaires within four days of admission and gave the researchers permission to access de-identified clinical files to obtain additional data. Participants also completed physical pain tolerance measurements (see *Measures* section). No compensation was provided for participation, and a university institutional review board approved all procedures.

This sample was, on average, 26.92 years of age ($SD = 7.86$, range = 18–58) and primarily non-Hispanic (96%) and White (94%). This sample has been described elsewhere (Smith et al., 2015a; Zuromski et al., 2015); however, the analyses and aims of the present study are unique in that this is the only study to examine the relationship between restrictive and non-restrictive eating disorder behaviors and acquired capability for suicide.

2.2. Measures

2.2.1. Diagnosis

As part of the intake procedure at the treatment center, eating disorder diagnoses were ascertained using a semi-structured diagnostic assessment based on *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision; *DSM-IV*; American Psychiatric Association, 2000) criteria. Given these diagnoses were derived prior to the publication of the *DSM-5* (American Psychiatric Association, 2013), diagnoses based on *DSM-5* criteria were formulated by reviewing participants' interview and self-report measures. These reviews were completed by doctoral-level researchers, who reached consensus on final diagnoses assigned to each participant. Participants with BMI below 18.5 kg/m^2 and interview/self-report data consistent with *DSM-5* behavioral and cognitive symptoms of AN were given a diagnosis of AN. For participants with BMI of 18.5 kg/m^2 or above, interview and self-report data were reviewed to determine whether they met *DSM-5* criteria for BN. Because there was not sufficient information available to diagnose *DSM-5* binge eating disorder (i.e., specific characteristics of binge episodes were not assessed), participants not meeting criteria for AN or BN were assigned an eating disorder-not otherwise specified (ED-NOS) diagnosis based on *DSM-IV* criteria. Given that our primary interest was in comparing those with AN to those with other eating disorder diagnoses, the inability to distinguish binge eating disorder from other unspecified eating disorders was not overly problematic. Based on these diagnostic guidelines, 34% of the sample had *DSM-5* diagnoses of AN, 27% *DSM-5* BN, and 39% *DSM-IV* ED-NOS.

2.2.2. Suicide attempt history

Data on the number of lifetime suicide attempts were gathered for each participant using a self-report question created for this study. Specifically, participants who responded affirmatively to the question *Have you ever made an actual attempt to kill yourself in which you had at least some intent to die?* were presented with a follow-up question regarding the lifetime number of suicide attempts (i.e., *How many suicide attempts have you made in your lifetime?)*. In our sample, the number of past attempts ranged from zero to eight, with 72% of the sample having zero attempts, 13% having one attempt, 6% having two attempts, and 8% having three or more attempts. Within the diagnostic groups, the range of suicide attempts was between zero (88.2%) and eight (2.9%) for those with AN, between zero (63.0%) and five (3.7%) for those with BN, and between zero (64.9%) and three (8.1%) for those with ED-NOS.

2.2.3. Physical pain tolerance

Physical pain tolerance was assessed using a Medoc Algomed pressure algometer. For each participant, the first author conducted five pain tolerance trials, separated by a 60-second interval. During each trial, pressure was applied to the participants' hands between the thumb and first finger, and was increased at a rate of five kilopascals (kPA) per second. Trials were discontinued when the participant indicated that the pain was too uncomfortable to continue by pressing a button, or when the maximum safety cutoff (i.e., 1000 kPa) was reached. To control for asymmetries in pain tolerance due to hand assessed (Pauli et al., 1999), all measurements were taken on the participants' right hands. If a participant had taken any type of analgesic within eight hours of this portion of data collection, pain tolerance measurements were rescheduled for a different date. Nine participants completed fewer than five trials due to either the algometer malfunctioning ($n=7$) or the participant choosing to discontinue the measurement ($n=2$). We averaged all participants' available pain tolerance scores across trials to derive a pain tolerance score. Internal consistency of the pain tolerance trials was excellent ($\alpha=0.95$). Pain tolerance data were unavailable for approximately half of the sample ($n=47$) because they 1) completed treatment before we began collecting this variable ($n=33$), 2) were discharged before measurements could be conducted ($n=7$), or 3) had recently consumed an analgesic and were unavailable to complete measurements at a later time ($n=7$). The time frame for completing these measurements ranged between one to 12 weeks after admission; 91% were completed within six weeks of admission.

2.2.4. Fearlessness about death

The Fearlessness about Death subscale of the Acquired Capability for Suicide Scale (ACSS-FAD; Ribeiro et al., 2014) consists of seven items (e.g., *I am not afraid to die*) rated on a 1 (*not at all like me*) to 5 (*very much like me*) scale, with higher scores indicating greater fearlessness about death. This subscale has been shown to have acceptable psychometric properties (Ribeiro et al., 2014). Internal consistency was good in the current sample ($\alpha=0.88$).

2.2.5. Eating disorder symptoms

The Eating Disorder Examination Questionnaire – Version 6 (EDE-Q; Fairburn and Beglin, 1994, 2008) was used to assess eating pathology. This self-report measure contains 28 items assessing frequency of eating disorder symptomatology over the past 28