

# Are Suicide-Specific Interventions Required to Reduce Suicidal Ideation? An Empirical Examination in a Clinical Sample of Eating-Disorder Participants

Clinical Psychological Science  
1–15

© The Author(s) 2024




Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/2167702624127476

www.psychologicalscience.org/CPS



Morgan Robison<sup>1</sup>, Mina Velimirovic<sup>2</sup>, Tyler Rice<sup>1</sup>,  
Alan Duffy<sup>3</sup>, Megan Riddle<sup>4,5</sup>, Jamie Manwaring<sup>3,4</sup>,  
Renee D. Rienecke<sup>3,6</sup>, Susan McClanahan<sup>3,6</sup>, Dan V. Blalock<sup>7,8</sup>,  
Daniel Le Grange<sup>9,10</sup>, Philip S. Mehler<sup>3,4,11</sup>,  
and Thomas E. Joiner<sup>1</sup>

<sup>1</sup>Department of Psychology, Florida State University; <sup>2</sup>Department of Psychology, University of Novi Sad;<sup>3</sup>Eating Recovery Center and Pathlight Mood and Anxiety Center, Denver, Colorado; <sup>4</sup>ACUTE at DenverHealth, Denver, Colorado; <sup>5</sup>Department of Psychiatry and Behavioral Sciences, University of Washington;<sup>6</sup>Department of Psychiatry and Behavioral Sciences, Northwestern University; <sup>7</sup>Center of Innovation to

Accelerate Discovery and Practice Transformation, Durham Veterans Affairs Medical Center, Durham,

North Carolina; <sup>8</sup>Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine;<sup>9</sup>Department of Psychiatry and Behavioral Sciences, University of California San Francisco School ofMedicine; <sup>10</sup>Department of Psychiatry and Behavioral Neuroscience, The University of Chicago; and<sup>11</sup>Department of Internal Medicine, University of Colorado School of Medicine

## Abstract

In this research, we examined whether non-suicide-specific treatments effectively reduced suicidal ideation (SI) among a clinical sample of eating-disorder (ED) patients ( $N = 3,447$ , of whom 50.9% presented with SI). All participants met criteria for a current ED diagnoses based on the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* and were administered a combination of evidence-based treatments in inpatient, residential, partial hospitalization, and intensive outpatient ED treatment facilities. Mediation analyses tested whether SI at discharge decreased specifically through standardized residual change scores in ED symptoms. Both SI and ED symptoms decreased over the course of treatment without clinically meaningful differences by ED diagnosis. ED symptom improvement partially mediated the relationship between SI at admission and discharge, suggesting that treating ED symptoms with evidence-based treatments can be an effective way to reduce SI, at least partially, for many patients. These findings demonstrate the importance of facilitating evidence-based-treatment referrals for specific disorders as a component of broad-based suicide outreach and prevention strategies.

## Keywords

eating disorders, suicidal ideation, suicide-specific interventions

Received 1/9/24; Revision accepted 7/24/24

Suicide is a global public-health crisis: More than 700,000 people die by suicide annually, and many more attempt and think about suicide (World Health Organization, 2024). Because of the prevalence of suicidal ideation (SI) and behaviors, effective interventions to reduce suicide risk are greatly needed. However,

there is ongoing debate about which types of intervention most effectively reduce suicide risk.

## Corresponding Author:

Morgan Robison, Department of Psychology, Florida State University  
Email: mrobison@psy.fsu.edu

Specifically, many researchers and clinicians have focused on suicide-specific interventions and have not emphasized the potential value of treating primary diagnoses to reduce SI (e.g., Acosta et al., 2013; Jobes et al., 2015). Others have argued that non-suicide-specific interventions alone do not typically improve SI (Brodsky et al., 2018; Labouliere et al., 2018). Accordingly, great emphasis has been put on suicide-specific interventions, both brief and comprehensive, over the past decades. Researchers have developed an increasing number of interventions, and these have shown to be fruitful in reducing suicide risk (for more details, see Jobes, 2023; Jobes et al., 2015; Stanley et al., 2023). Moreover, the zero-suicide model, a part of the National Strategy for Suicide Prevention, emphasizes the importance of using suicide-specific, evidence-based interventions to target suicidal thoughts and behaviors (Labouliere et al., 2018). The clinician-researchers developing these programs have emphasized these beliefs through statements such as the following:

In terms of treatment for suicide risk, the data from randomized controlled trials make it abundantly clear that the most effective clinical treatments for suicidal patients are psychosocial interventions that specifically focus on treating suicide, independent of a mental disorder diagnosis (G. K. Brown et al., 2005; Comtois et al., 2011; Gysin-Maillart et al., 2016; Jobes, 2012; Michel & Gysin-Maillart, 2015; Rudd et al., 2015). (Jobes, 2016, p. 51)

However, Cox et al. (2016) examined whether prolonged exposure (PE), an evidence-based treatment for posttraumatic stress disorder (PTSD), can reduce SI by reducing PTSD symptoms. Their results showed that PE effectively reduced PTSD symptoms in veterans, which was then followed by a decline in SI. A reduction in SI following symptom reduction has also been observed in other evidence-based treatments for PTSD in both adults (e.g., Gradus et al., 2013; Johnson et al., 2021) and adolescents (L. A. Brown et al., 2020). Research has also shown that cognitive-behavioral therapy for insomnia reduces SI by relieving insomnia symptoms (Kalmbach et al., 2022; Trockel et al., 2015).

In sum, suicide-specific interventions are widely accepted as effective treatments to reduce suicide risk. The efficacy of non-suicide-specific interventions, on the other hand, is still in question, although studies conducted so far provide promising results. Because the majority of previous studies assessing whether suicide risk and, more specifically, SI decline upon a reduction of symptoms of a primary diagnosis were conducted in the context of PTSD and insomnia, we

focused on another population in which SI is particularly high: eating-disorder (ED) patients.

## Suicide Risk in Individuals With EDs

EDs are severe and debilitating, resulting in both impaired physical health and psychosocial functioning (American Psychiatric Association, 2022; Klump et al., 2009). These disorders are not only disabling and costly but also may be deadly; elevated mortality has been observed in all EDs (Arcelus et al., 2011; Keel et al., 2003; van Hoeken & Hoek, 2020; Westmoreland et al., 2022).

Rates of suicide attempts are also substantially higher in people suffering from EDs than in the general population (e.g., 6.3% of ED patients compared with 0.3% to 1.4% of the general population; Borges et al., 2010; Suokas et al., 2014). This is concerning because a history of previous suicide attempts, especially multiple suicide attempts, is one of the most robust predictors of death by suicide (e.g., Joiner et al., 2009). Furthermore, previous research has shown that at least one-quarter to one-third of individuals with EDs have experienced SI in their lifetime (Smith et al., 2018). Other studies have reported that the lifetime prevalence of SI in ED patients can be as high as 68.9% in adolescents (Crow et al., 2014) and higher than 80% in adults (Duffy et al., 2021). As a point of reference, studies have shown that the lifetime prevalence of SI in the general population is around 9%, whereas the 12-month prevalence is around 2% (Borges et al., 2010; Nock et al., 2008).

EDs in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* (American Psychiatric Association, 2013) include anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), and other specified feeding or eating disorder (OSFED; American Psychiatric Association, 2022). However, we note that there are a number of other recognized EDs in the text revision of the *DSM-5* (American Psychiatric Association, 2022), such as avoidant/restrictive food intake disorder, pica, and rumination disorder, which are not included here. AN is characterized by severe caloric restriction, leading to significantly low body weight. Individuals with AN typically have an intense fear of gaining weight and a distorted body image and may deny the seriousness of their low body weight (American Psychiatric Association, 2022). When an individual with AN does not engage in any recent (i.e., in the last 3 months) bingeing or purging behaviors, they are specified as AN restricting (AN-R) subtype; however, if in the last 3 months, the individual has engaged in repeated bingeing/purging behaviors (e.g., excessive exercise and/or self-induced vomiting, diuretic misuse), they are specified as AN binge-eating/purging (AN-BP) subtype. BN shares behavioral

similarities with AN-BP (i.e., recurrent episodes of binge eating followed by compensatory behaviors to prevent weight gain) but does not have the diagnostic criteria of significantly low body weight. BED is characterized by recurring binge-eating episodes featuring objectively large quantities of food in a discrete period of time (i.e., within a 2-hour window). Individuals with BED do not engage in inappropriate compensatory behaviors and are not at a low body weight. Nevertheless, people with BED experience feelings of guilt, shame, and distress about their eating habits (American Psychiatric Association, 2022). Finally, the OSFED diagnosis encompasses a constellation of ED symptoms and is reserved for individuals who do not meet full criteria for a specific diagnosis. These conditions may include atypical presentations, subthreshold symptoms, or combinations of symptoms from different ED categories (American Psychiatric Association, 2022). Overall, each of these ED diagnostic subgroups represents a distinct pattern of disordered eating behaviors; however, all EDs involve significant psychological distress.

Research suggests that elevated levels of SI in ED patients are evenly distributed across diagnostic subgroups, including AN, BN, BED, and OSFED (Duffy et al., 2021; Smith et al., 2018; although cf. Kambanis et al., 2022). Most who experience SI do not attempt suicide, and even fewer die by suicide. Nonetheless, SI is, of course, a significant risk factor for suicide (e.g., Nock et al., 2008), and SI can cause substantial human suffering, which is why some suggest that reducing SI should be a goal in and of itself (Jobes & Joiner, 2019). Thus, to prevent suicide attempts and alleviate human suffering more generally, efforts should be directed toward timely identification and treatment of SI, especially in populations in whom SI is particularly elevated, as it is in individuals suffering from EDs.

## Mechanisms of SI in EDs

Several mechanisms that may indirectly account for the relationship between EDs and SI have been proposed, including but not limited to psychiatric comorbidities, low belongingness, high burdensomeness, interoceptive deficits, and impulsivity (e.g., Centers for Disease Control and Prevention, 2022; Forrest et al., 2016; Kwan et al., 2017; Smith et al., 2018). However, some studies have suggested that ED symptoms (e.g., dietary restriction, negative self-image, negative emotions) may contribute to SI directly (Brausch & Gutierrez, 2009). Longitudinally, one study supported the association between increases in ED symptoms and subsequent elevations in SI among males (Grunewald et al., 2022); however, other studies have reported only cross-sectional associations (although for significant associations

between Week 2 shape concerns, Week 3 eating concerns, and the subsequent weeks' SI, see Ortiz and Smith, 2020; Thiel et al., 2023). In light of these mixed findings, further research is warranted. Nevertheless, it remains reasonable to suggest that targeting ED symptoms through evidence-based ED treatment may reduce SI (see above for the rationale drawn from other clinical disorders; Gradus et al., 2013; Johnson et al., 2021; Kalmbach et al., 2022; Trockel et al., 2015).

We do not aim to challenge the idea that suicide-specific interventions benefit individuals at increased risk for suicide. Directly targeting risk has considerable rationale, as we stated above (see e.g., Jobes, 2023; Labouliere et al., 2018), and may be particularly valuable for individuals who have already made a suicide attempt and are at imminent risk (e.g., G. K. Brown et al., 2005; Gysin-Maillart et al., 2016), but it also has the potential downside of not addressing a primary condition (e.g., an ED) in which symptoms of the condition itself may be a main driver of SI. In routine care, health-care providers regularly treat the most impairing and distressing symptoms, symptoms that may generate and maintain SI; thus, disorder-focused, evidence-based treatments that stand to effectively remedy the primary clinical diagnosis/diagnoses may address those conditions and mitigate SI. Indeed, they may mitigate SI because they address the primary clinical diagnosis/diagnoses.

To our knowledge, this debate (i.e., whether non-suicide-specific interventions have a role in suicide prevention) remains somewhat unresolved overall and has not been extended to individuals with EDs. Therefore, we aimed to examine whether a routine non-suicide-specific treatment may reduce SI through ED symptom improvement. Specifically, in this study, we examine whether improvement in ED symptoms in response to ED-focused treatments will mediate the relationship between SI assessed at admission and discharge. Because ED symptoms have been shown to contribute to increased SI, it is hypothesized that ED symptom improvement will partially mediate the relationship between SI assessed at admission and discharge, suggesting that non-suicide-specific treatments can reduce SI, at least in some ED patients.

## Method

### *Participants and procedures*

The initial sample of this study included 3,447 adults. Data were collected from 33 ED treatment facilities across the United States that provide inpatient (IP), residential (RES), partial hospitalization (PHP), and intensive outpatient (IOP) ED-specific care. Participants were adults who received care at one of these facilities

between July 2020 and November 2022.<sup>1</sup> All participants met *DSM-5* (American Psychiatric Association, 2013, 2022) criteria for an ED at admission, established by licensed clinicians using the Structured Clinical Interview for DSM-5, patient edition. Demographic data were collected at admission as part of routine assessment. Self-report assessments were completed at two points, within 5 days of admission and 7 days of discharge.

## Treatment

IP treatment involved 24/7 care with medical monitoring; RES involved 24/7 care with less frequent medical monitoring; PHP involved treatment an average of 10 hours per day, 7 days per week; and IOP care included treatment 3 to 6 hours per day, 3 to 5 days per week.

The treatment at the IP, RES, and PHP levels of care each week included two individual psychotherapy sessions and one family-therapy psychotherapy session; 2 to 3 hours of group-format skills-training sessions occurred daily. The therapeutic work incorporated different evidence-based components of various treatment modalities. Individual therapy was drawn from acceptance and commitment therapy (S. C. Hayes et al., 2011), cognitive-behavioral therapy (Murphy et al., 2010; Waller et al., 2007), and dialectical-behavior therapy (DBT; Linehan, 2015); the family-therapy curriculum was founded in emotion-focused family therapy (Furrow et al., 2019).<sup>2</sup> We acknowledge that this treatment description is not adherent to a single evidence-based treatment, although we also note that such combined treatment reflects the treatment often provided at higher levels of care in real-world clinical practice.

All patients attended weekly sessions with registered dietitians and received meal support. At IP, RES, and PHP, this consisted of supervised meals three times per day and snacks provided two to three times per day. At IOP, patients ate one supervised meal each program day and logged additional meals and snacks in the Recovery Record mobile application. Each patient's dietitian reviewed and responded to food logs.

Regarding care, RES and PHP levels of care involved two sessions per week with a psychiatric provider (inpatients were monitored daily) and included psychopharmacologic management; IOP patients saw their outpatient psychiatric provider. Patients at IP, RES, and PHP also received daily nursing care and had access to a family/internal-medicine physician as needed. A continuity model of care was applied, meaning that patients were followed by the same treatment team across most levels of care (i.e., the primary therapist, primary care physician, psychiatrist, and dietitian remain consistent from IP to RES to PHP but typically change at IOP). However, patients routinely terminated care between

higher and lesser levels of care, mostly to return to their care teams in their respective communities after a good treatment response in the facility.

To ensure patient safety, all patients completed a comprehensive suicide-risk assessment (SRA) at admission with a licensed mental-health clinician, which was qualitatively documented in individual patient charts. The SRA asked detailed questions regarding recent SI, plans and preparations for a suicide attempt, and access to means for suicide. Patients provided details of any past suicidal or homicidal ideation, past suicide or homicide attempts, pertinent family history (i.e., related to suicide risk), and other known risk factors for suicide (i.e., health and psychosocial stressors). On the basis of these responses, the clinician determined the patient's suicide risk and consulted with the patient's psychiatrist to develop an appropriate treatment plan (i.e., for individuals with current ideation but no plans to attempt suicide). If patients exhibited strong SI with a plan to harm themselves or others, the clinician coordinated with the psychiatrist to transfer patients to an inpatient psychiatric facility either directly or via a psychiatric evaluation at a local emergency room.

## Measures

**Patient Health Questionnaire.** The Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001; Kroenke & Spitzer, 2002; Spitzer et al., 2014) suicide item (i.e., Item 9) is a single-item measure of SI. This item asks respondents how often over the last 2 weeks they have been bothered by thoughts that they would be better off dead or thoughts of hurting themselves in some way. Response options range from 0 to 3 (0 = *not at all*, 1 = *several days*, 2 = *more than half the days*, 3 = *nearly every day*). Although the PHQ-9 is somewhat overly inclusive and lacks some specificity, the wide usage of the PHQ-9 and the high sensitivity of the PHQ-9 suicide item make it a useful initial screening measure (Na et al., 2018). In addition, previous studies have shown that responses to Item 9 of the PHQ-9 are predictive of both suicide attempts and deaths by suicide (Louzon et al., 2016; Simon et al., 2013), supporting its validity as an SI screening tool. Moreover, other single-item indices of SI administered to patients in ED clinical settings have been supported in terms of their reliability and validity (see Joiner et al., 2022).

**Eating Disorder Examination–Questionnaire.** The Eating Disorder Examination–Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Mond et al., 2006) is a 28-item self-report measure focused on the past 28 days and used for assessing the frequency and severity of ED attitudes and behaviors. Subscale scores (i.e., restraint and eating,



shape concerns, and weight concerns) and a global score are derived using a 7-point Likert scale (0 = *no days/not at all*, 6 = *every day/markedly*); the higher scores indicate more pronounced symptoms. In this study, only the global EDE-Q score was used. The global score more so than the subscales is reported to be a valid measure of eating psychopathology (Jenkins & Rienecke, 2022). The internal consistency of the EDE-Q in the current sample was high at admission ( $\alpha = .92$ ) and discharge ( $\alpha = .92$ ).

### **Analytic plan**

The approach for this article was drawn from works testing the effectiveness of targeting a mediator as a means of reducing suicide risk (see Lieberman et al., 2023; cf. Burns et al., 2008; Fredrickson & Joiner, 2002). Largely because of the busy clinical settings of the study, missing data represented an issue.<sup>3</sup> Thus, we elected to first focus on a real subsample (i.e., without any missing data) and then reanalyze the results on the full sample (i.e., accounting for missing data). Demographic information, descriptive statistics, and the first mediation analyses were focused on a subsample ( $n = 2,441$ ) of the full sample ( $N = 3,447$ ) who had valid data at both admission and discharge; this subsample of patients was reasonably representative of the patient population as a whole in these clinical facilities. Descriptive statistics and zero-order correlations were computed to first determine the distributions and interconnectedness of all study variables. Next, to create a mediator variable, residual change scores were calculated for the EDE-Q global score by regressing discharge scores onto admission scores and then computing the difference between observed discharge scores and predicted discharge scores (Cronbach & Furby, 1970). This approach creates a metric of change free from associations with admission scores (i.e., through removing the regression artifact). Following this, all applicable models were tested for evidence of multicollinearity (where tolerance > .25; all variance inflation factor values < 5; Urban & Mayerl, 2006). To assess whether the residual EDE-Q change mediates the relationship between SI at admission and discharge, an indirect-effects analysis was conducted using the R *mediation* package (Version 4.5.01; Tingley et al., 2014). Specifically, the effect of SI at admission (T1) on SI at discharge (T2) was denoted by  $c$  (total effect). The path of admission SI (T1) to residual EDE-Q was denoted by  $a$ ;  $b$  denoted the path of EDE-Q (T1) to discharge SI (T2). The indirect effect ( $ab$ ) is a product of  $a$  and  $b$ . Finally, path  $c'$  denoted the direct effect of SI at admission (T1) to SI at discharge (T2) after including the EDE-Q in the model. The bootstrapping procedure (10,000 bootstrapped samples) was used to construct

95% confidence intervals (CIs) and test the overall mediation effect.

Analyses were then repeated on the full sample ( $N = 3,447$ ) using structural equation modeling to account for missing data and assess the robustness of our findings.<sup>4</sup> The R *lavaan* package (Version 0.6-16; Rosseel, 2012) with full information maximum likelihood estimates (Enders, 2001) and a bootstrapping procedure (10,000 samples) was employed. Finally, exploratory analyses tested the effect of ED diagnosis (i.e., AN-R type, AN-BP type, BN, BED, OSFED) on the results of the partially mediated model using A. Hayes's (2022) moderated mediation, Model 59, in which ED diagnosis was examined as a binary (i.e., 1 = has the diagnosis, 0 = does not have the diagnosis) for interpretability (A. Hayes, 2022). Five exploratory moderated mediation models were run for each diagnosis to rigorously test the mediator.

### **Transparency and Openness**

#### **Preregistration**

This study was not preregistered.

#### **Data, materials, code, and online resources**

This study's data are not publicly accessible. A portion of these data has been used in multiple prior publications because they were collected from a large clinical-treatment network in the United States (for a full list, see the Supplemental Material available online). However, a large proportion of the clients in this data set have not been included in prior publications, the aims and analyses of the current article do not overlap with any prior work, and the analyses and results presented have not been previously published. Code used to complete mediation and moderated mediation analyses are available on request sent to M. Robison. Study measures used were drawn from existing measures and are publicly accessible.

### **Reporting**

Participants were recruited from ED treatment facilities across the United States that provide IP, RES, PHP, and IOP ED-specific care. Thus, given the nature of data-collection procedures, a priori power analyses were not conducted. Likewise, measures were determined before this study was conceptualized. There were no experimental manipulations in this study, and we report how we determined our sample size, all data exclusions, and all measures in the study.

**Table 1.** Sample Characteristics

	<i>N</i> (%)
Gender	
Female	2,080 (85.9)
Male	143 (5.9)
Nonbinary	58 (2.4)
Genderqueer	61 (2.5)
Female to male	27 (1.1)
Male to female	10 (0.4)
Other category	30 (1.2)
Did not disclose	12 (0.5)
Race	
White	2,054 (84.8)
American Indian/Alaska Native	6 (0.2)
Asian	71 (2.9)
Black/African American	67 (2.8)
Hispanic or Latino	129 (5.3)
Mixed	1 (< .01)
Native Hawaiian/Pacific Islander	4 (0.2)
Other	86 (3.6)
Choose not to disclose	3 (0.1)
Level of care: admission	
Inpatient	550 (22.7)
Residential	916 (37.8)
Partial hospitalization	602 (24.9)
Intensive outpatient	353 (14.0)
Primary diagnosis	
AN-R	794 (32.8)
AN-BP	450 (18.6)
BN	194 (8.0)
BED	142 (5.9)
OSFED	841 (34.7)

Note: AN-R = anorexia nervosa restricting; AN-BP = anorexia nervosa binge-eating/purging; BN = bulimia nervosa; BED = binge eating disorder; OSFED = other specified feeding or eating disorder.

## Ethical approval

The protocol for this study was approved by the Salus Institutional Review Board. Each participant provided informed consent before completing self-report measures.

## Results

### Descriptive statistics

Demographic and descriptive information are provided for a subset of the sample ( $n = 2,421$ ; see Tables 1 and 2) who had complete data on SI and EDE-Q at both admission and discharge. The first mediation analysis was computed using this sample.

Geographically, the sample resided across all 50 states; the largest state residencies included Texas

(18.1%;  $n = 439$ ) and Colorado (10.6%;  $n = 256$ ). The sample had ages ranging from 18 to 68 ( $M = 26.7$  years,  $SD = 9.9$ ) and was predominantly female (85.9%;  $n = 2,080$ ). Most of the participants identified as White (84.8%;  $n = 2,054$ ). The sample met *DSM-5* (American Psychiatric Association, 2013) criteria for the following: AN-R (32.8%;  $n = 794$ ), AN-BP (18.6%;  $n = 450$ ), BN (8.0%;  $n = 194$ ), BED (5.9%;  $n = 142$ ), or OSFED (34.7%;  $n = 841$ ).<sup>5</sup> The average number of weeks in treatment was 9.4 ( $SD = 7.1$ ); there were no significant differences in length of stay by level of treatment care. Levels of care at admission for the sample were as follows: 22.7% received IP care ( $n = 550$ ), 37.8% received RES care ( $n = 916$ ), 24.9% received PHP care ( $n = 602$ ), and 14.6% received IOP care ( $n = 353$ ). The majority of participants discharged at lower levels of care than they were admitted (61.8%;  $n = 1,496$ ); 36.6% stayed in the same level of care ( $n = 885$ ), and 1.7% discharged at higher levels of care than they were admitted ( $n = 40$ ). Levels of care at discharge for the sample were as follows: 2.7% received IP care ( $n = 65$ ), 16.6% received RES care ( $n = 402$ ), 40.5% received PHP care ( $n = 981$ ), and 40.2% received IOP care ( $n = 973$ ). Care was terminated for 13 different reasons; the most common were due to a routine end of treatment (66.3%;  $n = 1,605$ ) and due to a patient/parent request (21.5%;  $n = 521$ ); for all termination reasons, see the Supplemental Material. For a full list of descriptive statistics, see Table 1.

## Correlations

For descriptive statistics and bivariate correlations for admission and discharge scores, see Tables 2 and 3. Regarding SI, 50.9% ( $n = 1,232$  of 2,421) of participants scored  $> 0$  on the PHQ-9 Item 9 at admission, and 37.8% ( $n = 915$  of 2,421) scored  $> 0$  on PHQ-9 Item 9 at discharge. The reduction in SI from admission to discharge is notable and as expected (Chen et al., 2008). Admission and discharge EDE-Q averages were 4.0 ( $SD = 1.5$ ) and 2.3 ( $SD = 1.4$ ), respectively—a significant decrease (see below), as would be expected.

Regarding bivariate correlations, the PHQ-9 Item 9 had a moderate correlation between admission and discharge ( $r = .54$ ,  $p < .001$ ), similar to prior work using this index and more generally for measures of SI (Green et al., 2015). Correlations between the PHQ-9 Item 9 and the residual score of the EDE-Q were also significant (i.e., .10 at admission, .41 at discharge).

## Mediation

Table 4 summarizes the results of all regression/mediation analyses. In Step 1 of the model, admission PHQ-9 Item 9 (T1) was significantly and positively associated

**Table 2.** Descriptive Statistics

	<i>N</i> (%)	Range	<i>M</i>	<i>SD</i>	Skewness (.048)	Kurtosis (.096)
Age	2,421	18–68	26.71	9.92	1.69	2.43
Admission time (weeks)	2,421	0–105	9.35	7.07	2.18	16.02
PHQ-9 Item 9 (T1)	2,421	0–3	0.90	1.06	0.84	–0.64
0	1,189 (49.1)					
1	593 (24.5)					
2	331 (13.7)					
3	308 (12.7)					
PHQ-9 Item 9 (T2)	2,421	0–3	0.60	0.91	1.43	0.99
0	1,506 (62.2)					
1	545 (22.5)					
2	199 (8.2)					
3	171 (7.1)					
EDE-Q global (T1)	2,421	0–6	3.96	1.45	–0.93	0.04
EDE-Q global (T2)	2,421	0–6	2.33	1.42	0.23	–0.90
EDE-Q global residual	2,421	–3.4 to 3.5	0.01	1.20	–0.04	–0.37

Note: T1 = admission; T2 = discharge; PHQ-9 = Patient Health Questionnaire; EDE-Q=Eating Disorder Examination–Questionnaire.

with discharge PHQ-9 Item 9 (T2;  $\beta_c = 0.54$ ,  $SE = 0.02$ ,  $p < .001$ ), with a notable effect size ( $sr^2 = .292$ ). In Step 2, the admission PHQ-9 Item 9 (T1) was significantly and positively associated with the EDE-Q residual score ( $\beta_a = 0.10$ ,  $SE = 0.02$ ,  $p < .001$ ), with a small effect size ( $sr^2 = .010$ ). In Step 3, both the PHQ-9 Item 9 (T1;  $\beta_c = 0.50$ ,  $SE = 0.02$ ,  $p < .001$ ,  $sr^2 = .299$ ) and the EDE-Q residual score ( $\beta_b = 0.36$ ,  $SE = 0.02$ ,  $p < .001$ ,  $sr^2 = .177$ ) were significantly and positively associated with the PHQ-9 Item 9 (T2).

Finally, the partial mediation model, using 10,000 bootstrapped samples to estimate CIs for the indirect relation, was also significant (see Fig. 1). Results showed that the indirect relation between PHQ-9 Item 9 (T1) and PHQ-9 Item 9 (T2) through EDE-Q residual scores was statistically significant ( $ab = 0.10 \times 0.36 = 0.04$ , 95% CI = [0.02, 0.04]). The mediation proportion, or the estimate to which the total effect is accounted for through the mediation variable, was 0.066.

Next, a structural equation model with 10,000 bootstrapped samples was employed to reanalyze results, accounting for missing data and to assess the robustness of our findings. Only 11 participants were lost to completely unusable data (3,436 used of 3,447), and the findings were nearly identical to the original ones ( $\beta_c = 0.53$ , 95% CI = [0.43, 0.50],  $p < .001$ ;  $\beta_a = 0.10$ , 95% CI = [0.07, 0.16],  $p < .001$ ;  $\beta_c = 0.50$ , 95% CI = [0.40, 0.46],  $p < .001$ ;  $\beta_b = 0.36$ , 95% CI = [0.25, 0.30],  $p < .001$ ;  $ab = 0.04$ , 95% CI = [0.02, 0.04]).

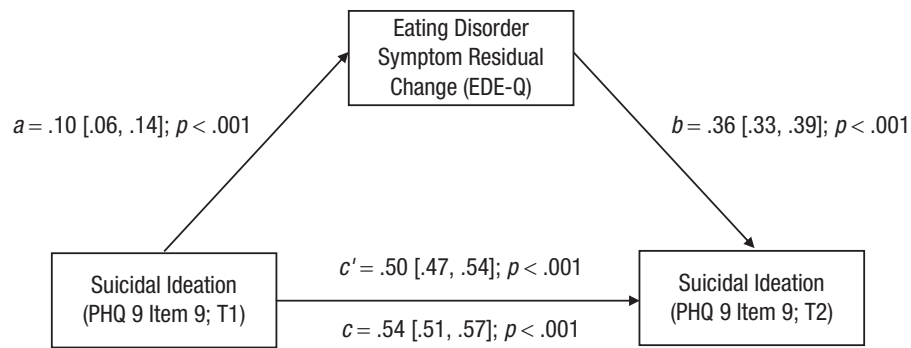
Exploratory analyses (i.e., moderated mediation analyses) tested the effect of ED diagnoses (i.e., AN-R, AN-BP, BN, BED, OSFED) on the mediation model. The overall moderated mediation pattern suggested that ED

diagnosis did not substantially influence mediation models. Even when differences were observed between the effects (e.g., where there was a difference in the  $c'$  path), there were no directional changes (i.e., both groups displayed overall improvement). Although exploratory, two ED diagnoses reported SI levels that were different from their comparison group (i.e., all other EDs combined). In the case of AN-BP as a moderator, the  $c'$  path was significant ( $p = .026$ ,  $sr^2 = .001$ ) such that individuals with AN-BP had slightly elevated rates of reported SI at discharge (i.e., moderated  $c'$  path  $b = 0.490$ ,  $p < .001$ ), more so than individuals without a diagnosis of AN-BP ( $b = 0.416$ ,  $p < .001$ ). Alternatively, BED's  $c'$  path was significant ( $p = .014$ ,  $p < .001$ ) such that individuals with BED had lowered rates of reported SI at discharge (i.e., moderated  $c'$  path  $b = 0.271$ ,  $p < .001$ ), more so than individuals without a diagnosis of BED ( $b = 0.436$ ,  $p < .001$ ). Overall, there was no robust evidence of moderated mediation in these exploratory

**Table 3.** Bivariate Correlations of the Investigated Variables

	2	3	4	5
1. PHQ-9 Item 9 (T1)	.54**	.10**	.34**	.28**
2. PHQ-9 Item 9 (T2)		.41**	.24**	.48**
3. EDE-Q residual			–.03	.82**
4. EDE-Q (T1)				.54**
5. EDE-Q (T2)				

Note: T1 = admission; T2 = discharge; PHQ-9 = Patient Health Questionnaire; EDE-Q=Eating Disorder Examination–Questionnaire.  
\*\* $p < .001$ .



**Fig. 1.** Mediation model including Patient Health Questionnaire Item 9 (T1, predictor), Eating Disorder Examination–Questionnaire residual score (mediator), and Patient Health Questionnaire Item 9 (T2, outcome).

analyses (i.e., an omnibus test of the indirect effect; Preacher et al., 2007) reflected in the “index of moderated mediation” (A. Hayes, 2022), indicating that the null fell between the lower and upper limit of the 95% CIs of all models.

## Discussion

In the present study, using a mediational analytic approach supported in previous work (Lieberman et al., 2023; cf. Burns et al., 2008; Fredrickson & Joiner, 2002), we examined whether SI could decrease through evidence-based ED treatment first on a subset of the sample with admission and discharge data and then repeated with the full sample using full information maximum likelihood estimates to demonstrate maximal consistency of the effect. Specifically, we tested whether ED symptom improvement (measured by the residual change in ED symptoms via the EDE-Q) mediates the relationship between SI at admission and discharge, focusing on a subsample of the data ( $n = 2,421$ ) who had complete data at both admission and discharge. Mediation results suggested that residual change in ED symptoms partially mediated the link between SI at admission and discharge, with a mediation proportion effect size of 0.066. The analysis was then done on the full sample ( $n = 3,447$ ) using structural equation modeling to account for missing data. The results were almost identical to the previous ones. Moreover, these results aligned when controlling for length of stay (see Note 5). Finally, as an addition to the main analyses, we explored whether ED diagnoses moderated these mediational effects (i.e., each ED diagnosis was treated as a separate, binary yes/no moderator); our results showed that although some differences in the effects were present, these were not substantial. Nevertheless, we note that the somewhat elevated SI among individuals with AN-BP aligns with previous work in which the ED behavior of purging was most related to suicide risk

(Joiner et al., 2022). In addition, the reduced SI among BED patients may, in part, be explained by higher levels of body mass index, which has been proposed as a potential protective factor (Dutton et al., 2013), although there is also conflicting evidence (Smith et al., 2018). Therefore, future work should continue to explore how each ED diagnosis may uniquely infer SI.

Although not included in these analyses, it is important to consider other potential suicide-relevant moderators that may affect our findings. One such example is past suicidal behaviors (i.e., lifetime suicide attempts). Future work should examine whether a lifetime suicide attempt may alter the clinical implications of these results: Should it prove to be a significant moderator, such that individuals with a previous suicide attempt do not experience SI reductions through a reduction in ED symptoms, this may indicate a clinical urgency toward incorporating suicide-specific interventions into routine ED treatment to directly target risk (G. K. Brown et al., 2005; Gysin-Maillart et al., 2016).

However, the findings presented by the current study suggest that a combination of evidence-based ED treatments by ED expert clinicians in an ED treatment center (i.e., non-suicide-specific interventions) might effectively reduce SI among individuals diagnosed with EDs. These findings align with prior research suggesting that alleviating the symptoms of the most proximate distressing and impairing clinical diagnosis causes SI to decrease alongside such reductions (e.g., PTSD and insomnia; Cox et al., 2016; Gradus et al., 2013; Johnson et al., 2021; Kalmbach et al., 2022; Trockel et al., 2015). It may be that the symptoms of these specific disorders are the mechanisms that spur and maintain SI in the first place (i.e., trauma, sleeplessness, and restricting/binging/purging food; Centers for Disease Control and Prevention, 2022).

The correlational differences between the residual score of the EDE-Q and the PHQ-9 Item 9 at admission ( $r = .10$ ) compared with the PHQ-9 Item 9 at discharge



**Table 4.** Regression Analyses of Suicidal Ideation Mediated Through Eating-Disorder Treatment

	Mediation, $N = 2,421$					$sr^2$
	$\beta$	$SE$	95% CI	T	Adjusted $R^2$	
Step 1: outcome: PHQ-9 discharge (T2)					.292	
PHQ-9 admission (T1)	0.54***	0.017	[0.51, 0.57]	31.55		.292
Step 2: outcome: EDE-Q residual					.010	
PHQ-9 admission (T1)	0.10***	0.02	[0.06, 0.14]	4.92		.010
Step 3: outcome: PHQ-9 discharge (T2)					.419	
EDE-Q residual	0.36***	0.02	[0.33, 0.39]	22.98		.177
PHQ-9 admission (T1)	0.50***	0.02	[0.47, 0.54]	32.36		.299

Note: PHQ-9 = Patient Health Questionnaire; EDE-Q=Eating Disorder Examination–Questionnaire; CI = confidence interval.

\*\*\* $p < .001$ .

( $r = .41$ ) are of potential interest. At admission, of course, treatment had not yet or only very recently started. At discharge, by contrast, a full course of treatment had been administered. Our thesis is that treatment-driven changes in ED symptoms at least partially account for decreases in SI, and we view the relative sizes of these correlations (i.e., relatively small at admission, more sizable at discharge) as consistent with treatment taking effect in the interval between admission and discharge. More overarching, we view the totality of findings as consistent with the possibility that treatment took effect both on ED symptoms and SI and took effect on SI in part because it took effect on ED symptoms.

One more fine-grained explanation for the relationship between decreases in ED symptoms and decreases in SI is that evidence-based treatments for EDs, when administered by expert clinicians in an appropriate level of care, target not just the behaviors of disordered eating but also negative self-image and negative emotions (e.g., self-disgust, sadness, anger, and fear; Espeset et al., 2012), and that, in turn, may reduce SI by creating a more meaningful life (Rance et al., 2017). These effects may be further bolstered by the group settings provided in treatment facilities where others can empathize with, validate, and provide hope regarding an individual's ED experiences. Future research should continue to explore other psychological mechanisms that might explain changes in SI above and beyond changes in ED symptoms. In addition, patients often describe EDs as mentally and physically exhausting, making them tired and irritable (e.g., Malson et al., 2011; Patching & Lawler, 2009). The effects of malnutrition alone can cause psychological symptoms that treatment refeeding (i.e., diet variety and nutrition) will resolve (Hatch et al., 2009). Thus, it may be that the alleviation of neighboring symptoms, which may have felt draining, contributes directly to reduced SI.

These findings send a message of hope to clinicians working with individuals diagnosed with EDs regarding suicide intervention and prevention. Although we soundly believe that clinicians should continually use “gold-standard” suicide-risk assessments (for a review, see Batterham et al., 2015) and evidence-based suicide-specific interventions (i.e., creating coping cards, identifying reasons for living, safety planning, means safety; Nuij et al., 2021; Yip et al., 2012), effectively treating the most distressing and impairing symptoms alone may be sufficient to reduce suicide risk in an ED population, at least in individuals in whom this risk is not imminent. In our sample, rates of severe SI (i.e., endorsement of daily thoughts of death or self-inflicted injury) decreased by 44% from admission (12.7% endorsement) to discharge (7.1% endorsement). On the one hand, this is a substantial decrease, consistent with the overall thrust of the current article. On the other hand, that 7.1% of the sample continued to endorse severe SI at discharge can be viewed as at odds with our thesis; it can also be viewed as somewhat unsurprising in that (a) many patients in our sample transitioned from higher levels to lower levels of care (e.g., were “discharged”—perhaps more accurately, stepped down—from IP to RES levels of care or from RES to PHP levels of care) and (b) the modal overall clinical presentation in general and regarding SI in particular in our sample was severe compared with many other clinical samples. Crucially, we are in no way suggesting, much less endorsing, the clinical neglect of suicide risk; we are, rather, suggesting that resolution of mental disorders is in and of itself an important avenue for reducing suicide risk.

### Limitations and strengths

A first limitation concerns the self-reported nature of ED symptoms and SI; nondisclosure may have affected data validity given the sensitive nature of suicidality. However,

patients had no incentive to distort this information—care would have been provided regardless of suicidal endorsement. As with most ED treatment facility demographics, the participants were predominantly White, cisgender women, diagnosed with AN or OSFED. In addition, these data did not include measures of income, education, or socioeconomic status. Thus, future studies should continue to examine whether these results hold across more diverse samples. One such area for future research includes individuals with a diagnosis of avoidant/restrictive food intake disorder (ARFID; American Psychiatric Association, 2022). When we reran analyses exclusively on an ARFID subsample, the results presented here did not replicate. One potential explanation may be that the ARFID group reported significantly lower SI at both admission and discharge, which contradicts previous research (see Robison et al., 2022). Nevertheless, this subsample's SI levels reduced by half throughout the course of treatment: Thus, it is likely that the changes in SI were not accurately captured by residual EDE-Q scores. Because the EDE-Q does not assess symptoms of ARFID (e.g., the avoidance of food based on the sensory characteristics of food), future research should continue to compare suicide risk across EDs and incorporate measures specific to ARFID to determine whether a reduction in ARFID symptoms mediates changes in SI.

Relatedly, the study timeline overlapped with COVID-19. Because COVID-19 was an unprecedented time, it may have affected ED symptoms and rates of SI (e.g., a small percentage of patients were discharged because of COVID-19-related reasons; see the Supplemental Material). Thus, we encourage replication of this study to robustly generalize our findings.

We also acknowledge that in mediation analyses, the temporal precedence of the independent variable vis-à-vis the mediator and of the mediator vis-à-vis the dependent variable (e.g., three separate time points) are preferable; thus, we encourage future work to replicate these findings. However, on the basis of the analytic approaches provided by previous research (see Lieberman et al., 2023; cf. Burns et al., 2008; Fredrickson & Joiner, 2002), we believe the two-point scenario presented here is still quite viable. Overall, many participants with admission data did not have available discharge data. We addressed this limitation to a fair extent by assessing whether individuals with complete data differ from individuals who provided data only at admission and using structural equation modeling to account for missing data and otherwise, but it nonetheless should be factored into our results' implications. Moreover, future studies should account for comorbidities, which could be important in understanding changes in SI. An important limitation of this study is the use of a single item (PHQ-9 Item 9) as a measure

of SI. However, as noted earlier in this text, there is evidence to support the reliability and validity of this specific index (Louzon et al., 2016; Na et al., 2018; Simon et al., 2013) and of single-item indexes of SI more generally (Joiner et al., 2022; Robison et al., 2022; although cf. Mournet et al., 2021). Nevertheless, we encourage future research to replicate these findings with a more comprehensive assessment of SI. Relatedly, future studies should examine whether the mediation model proposed here extends to suicide risk more generally, beyond a general index of ideation (e.g., suicide plan, suicidal intent). Finally, we acknowledge that the patients at these ED treatment facilities were treated by experienced clinicians and received various forms of psychotherapy, including weekly group (DBT) sessions. Although DBT, when applied with full or near-full fidelity to all its aspects (see Linehan, 1993), is a “gold standard” for reducing suicidal behavior (see DeCou et al., 2019), our sample did not receive full DBT with all its components. Instead, the DBT-based elements received by our sample were almost entirely related to emotion regulation and were not specifically focused on suicidality. Nevertheless, these group-based emotion-regulation sessions may be viewed by some as possessing a suicide-specific element. However, the primary treatment target for all patients was ED symptom improvement, not SI reduction. A final limitation is that the ED care delivered in this study was all in person, and thus our findings cannot necessarily be generalized to a virtual method of ED care, a potentially interesting avenue for future research.

We also note the strengths of this study. The current study uses a large, fairly severe ED clinical sample. Moreover, the patients were diverse with respect to their geographic location, ED diagnoses, and treatment levels of received care. Finally, the longitudinal nature of data collection allowed us to track change in SI from admission to discharge.

## Conclusion

Evaluating the effectiveness of evidence-based interventions (both suicide-specific and non-suicide-specific) in reducing suicide risk is crucial because death by suicide specifically and suicidality more generally represent major public-health concerns. The results of this study alongside the results of previous research on PTSD and insomnia support the notion that evidence-based interventions treating primary diagnoses may aid in broad-based suicide-prevention efforts. Therefore, suicide-prevention infrastructures, such as the zero-suicide model, a part of the National Strategy for Suicide Prevention (Labouliere et al., 2018), may benefit from encouraging further implementation and evaluation of both suicide-specific and

non-suicide-specific interventions. Across interventions and clinical settings, suicide risk should be monitored and managed as needed; our findings suggest that non-suicide-specific interventions may represent one tool in clinicians' armament for this purpose.

## Transparency

Action Editor: Kelsie T. Forbush

Editor: Jennifer L. Tackett

Author Contributions

**Morgan Robison:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Visualization, Writing – original draft, Writing – review & editing.

**Mina Velimirovic:** Writing – original draft, Writing – review & editing.

**Tyler Rice:** Writing – original draft, Writing – review & editing.

**Alan Duffy:** Data curation, Methodology, Resources.

**Megan Riddle:** Writing – review & editing.

**Jamie Manwaring:** Writing – review & editing.

**Renee D. Rienecke:** Writing – review & editing.

**Susan McClanahan:** Writing – review & editing.

**Dan V. Blalock:** Investigation, Writing – review & editing.

**Daniel Le Grange:** Writing – review & editing.

**Philip S. Mehler:** Funding acquisition, Supervision, Writing – review & editing.

**Thomas E. Joiner:** Conceptualization, Formal analysis, Funding acquisition, Supervision, Writing – original draft, Writing – review & editing.

## Declaration of Conflicting Interests


R. D. Rienecke receives consulting fees from the Training Institute for Child and Adolescent Eating Disorders, LLC, and receives royalties from Routledge. D. Le Grange receives royalties from The Guilford Press and Routledge, is codirector of the training Institute for Child and Adolescent Eating Disorders, LLC, and is a member of the Clinical Advisory Board at Equip Health.


## Funding

M. Robison was supported by the National Institute of Mental Health (Grant 5T32MH093311-12). M. Velimirovic was supported by the Institute of International Education through the Fulbright Foreign Student Program. D. V. Blalock was supported by the Career Development Award 19–035 (IK2HX003085-01A2) from the United States Department of Veterans Affairs Health Services Research and Development Service.

## ORCID iDs

Morgan Robison  <https://orcid.org/0000-0002-8685-9259>

Mina Velimirovic  <https://orcid.org/0000-0001-5685-7933>

Alan Duffy  <https://orcid.org/0000-0002-8697-9285>

## Acknowledgments

These results have not been previously disseminated, the data are not available (i.e., data involves medical health records, and participants did not consent to de-identified public data

sharing), but materials and code are accessible by contacting M. Robison. Hypotheses and analyses were not preregistered. Opinions, interpretations, conclusions, and recommendations are those of the authors and are not necessarily endorsed by the National Institute of Mental Health.

## Supplemental Material

Additional supporting information can be found at <http://journals.sagepub.com/doi/suppl/10.1177/21677026241274746>

## Notes

1. The selected timeline was purely practical in that it was the time frame when the current measures were used. For an acknowledgment of the overlap between this time frame and COVID-19, see the Discussion section.
2. We acknowledge that DBT is recognized as a “gold-standard” intervention to reduce suicidal behavior (see DeCou et al., 2019), although even when it is administered closely following materials developed by Linehan (e.g., Linehan, 2015), it is debatable whether it is a suicide-specific treatment per se compared with, for example, the Collaborative Assessment and Management of Suicidality (Jobes, 2012, 2016), which clearly is. However, in these treatment facilities, the format of DBT is altered and administered to focus predominantly on emotion regulation. Although individuals who endorse suicide risk on diary cards do receive additional risk assessments and support, as in all or most mental-health-treatment facilities when suicidality is noted, the primary treatment target for all patients is ED symptom improvement, not suicide-risk reduction. Nevertheless, we note that targeting ED symptoms in no way equated to neglecting suicidality.
3. We acknowledge that individuals who complete assessments at both admission and discharge may differ from individuals who complete them only at admission. Analyses conducted on a related sample indicated that attrition had no influence on outcomes (Joiner et al., 2022), and analyses on the present sample further affirmed that view.
4. The results remained when using multiple-imputation approaches to handle missing data and when analyzing only individuals with admission data ( $n = 3,420$ ). Note that all models were rerun controlling for the number of weeks admitted. All results aligned across these analyses.
5. This sample does not include patients with the diagnosis of ARFID. When examining the subset of patients with a diagnosis of ARFID, the results did not replicate. Potential explanations for this diagnostic difference are provided in the Limitations section.

## References

- Acosta, J., Ramchand, R., Jaycox, L. H., Becker, A., & Eberhart, N. K. (2013). Interventions to prevent suicide: A literature review to guide evaluation of California's mental health prevention and early intervention initiative. *Rand Health Quarterly*, 2(4), Article 2. [https://www.rand.org/pubs/technical\\_reports/TR1317.html](https://www.rand.org/pubs/technical_reports/TR1317.html)
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.).

- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., Text rev.).
- Arcelus, J., Mitchell, A. J., Wales, J., & Nielsen, S. (2011). Mortality rates in patients with anorexia nervosa and other eating disorders. *Archives of General Psychiatry*, 68(7), 724–731. <https://doi.org/10.1001/archgenpsychiatry.2011.74>
- Batterham, P. J., Ftanou, M., Pirkis, J., Brewer, J. L., Mackinnon, A. J., Beautrais, A., Kate Fairweather-Schmidt, A., & Christensen, H. (2015). A systematic review and evaluation of measures for suicidal ideation and behaviors in population-based research. *Psychological Assessment*, 27(2), 501–512. <https://doi.org/10.1037/PAS0000053>
- Borges, G., Nock, M. K., Haro Abad, J. M., Hwang, I., Sampson, N. A., Alonso, J., Andrade, L. H., Angermeyer, M. C., Beautrais, A., Bromet, E., Bruffaerts, R., de Girolamo, G., Florescu, S., Gureje, O., Hu, C., Karam, E. G., Kovess-Masfety, V., Lee, S., Levinson, D., . . . Kessler, R. C. (2010). Twelve-month prevalence of and risk factors for suicide attempts in the World Health Organization World Mental Health Surveys. *The Journal of Clinical Psychiatry*, 71(12), 1617–1628. <https://doi.org/10.4088/JCP.08m04967blu>
- Brausch, A. M., & Gutierrez, P. M. (2009). The role of body image and disordered eating as risk factors for depression and suicidal ideation in adolescents. *Suicide and Life-Threatening Behavior*, 39(1), 58–71. <https://doi.org/10.1521/suli.2009.39.1.58>
- Brodsky, B. S., Spruch-Feiner, A., & Stanley, B. (2018). The zero suicide model: Applying evidence-based suicide prevention practices to clinical care. *Frontiers in Psychiatry*, 9, Article 33. <https://doi.org/10.3389/fpsy.2018.00033>
- Brown, G. K., Ten Have, T., Henriques, G. R., Xie, S. X., Hollander, J. E., & Beck, A. T. (2005). Cognitive therapy for the prevention of suicide attempts. *JAMA*, 294(5), 563–570. <https://doi.org/10.1001/jama.294.5.563>
- Brown, L. A., Belli, G., Suzuki, N., Capaldi, S., & Foa, E. B. (2020). Reduction in suicidal ideation from prolonged exposure therapy for adolescents. *Journal of Clinical Child & Adolescent Psychology*, 49(5), 651–659. <https://doi.org/10.1080/15374416.2019.1614003>
- Burns, A. B., Brown, J. S., Sachs-Ericsson, N., Ashby Plant, E., Thomas Curtis, J., Fredrickson, B. L., & Joiner, T. E. (2008). Upward spirals of positive emotion and coping: Replication, extension, and initial exploration of neurochemical substrates. *Personality and Individual Differences*, 44(2), 360–370. <https://doi.org/10.1016/j.paid.2007.08.015>
- Centers for Disease Control and Prevention. (2022). *Risk and protective factors suicide*. <https://www.cdc.gov/suicide/factors/index.html>
- Chen, E. Y., Matthews, L., Allen, C., Kuo, J. R., & Linehan, M. M. (2008). Dialectical behavior therapy for clients with binge-eating disorder or bulimia nervosa and borderline personality disorder. *International Journal of Eating Disorders*, 41(6), 505–512. <https://doi.org/10.1002/eat.20522>
- Comtois, K. A., Jobes, D. A., O'Connor, S. S., Atkins, D. C., Janis, K., Chessen, C. E., Landes, S. J., Holen, A., & Yuodelis-Flores, C. (2011). Collaborative assessment and management of suicidality (CAMS): Feasibility trial for next-day appointment services. *Depression and Anxiety*, 28(11), 963–972. <https://doi.org/10.1002/da.20895>
- Cox, K. S., Mouilso, E. R., Venners, M. R., Defever, M. E., Duvivier, L., Rauch, S. A. M., Strom, T. Q., Joiner, T. E., & Tuerk, P. W. (2016). Reducing suicidal ideation through evidence-based treatment for posttraumatic stress disorder. *Journal of Psychiatric Research*, 80, 59–63. <https://doi.org/10.1016/j.jpsychires.2016.05.011>
- Cronbach, L. J., & Furby, L. (1970). How we should measure “change”: Or should we? *Psychological Bulletin*, 74(1), 68–80. <https://doi.org/10.1037/h0029382>
- Crow, S. J., Swanson, S. A., le Grange, D., Feig, E. H., & Merikangas, K. R. (2014). Suicidal behavior in adolescents and adults with bulimia nervosa. *Comprehensive Psychiatry*, 55(7), 1534–1539. <https://doi.org/10.1016/j.comppsy.2014.05.021>
- DeCou, C. R., Comtois, K. A., & Landes, S. J. (2019). Dialectical behavior therapy is effective for the treatment of suicidal behavior: A meta-analysis. *Behavior Therapy*, 50(1), 60–72. <https://doi.org/10.1016/J.BETH.2018.03.009>
- Duffy, M. E., Siegfried, N., Bass, G., & Joiner, T. E. (2021). Presence and severity of suicidal thoughts and behaviors across the eating disorder diagnostic spectrum: A pilot study. *Journal of Clinical Psychology*, 77(4), 1045–1053. <https://doi.org/10.1002/jclp.23095>
- Dutton, G. R., Bodell, L. P., Smith, A. R., & Joiner, T. E. (2013). Examination of the relationship between obesity and suicidal ideation. *International Journal of Obesity*, 37(9), 1282–1286. <https://doi.org/10.1038/ijo.2012.224>
- Enders, C. K. (2001). The performance of the full information maximum likelihood estimator in multiple regression models with missing data. *Educational and Psychological Measurement*, 61(5), 713–740. <https://doi.org/10.1177/0013164401615001>
- Espeset, E. M. S., Gulliksen, K. S., Nordbø, R. H. S., Skårderud, F., & Holte, A. (2012). The link between negative emotions and eating disorder behaviour in patients with anorexia nervosa. *European Eating Disorders Review*, 20(6), 451–460. <https://doi.org/10.1002/erv.2183>
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *The International Journal of Eating Disorders*, 16(4), 363–370.
- Forrest, L. N., Bodell, L. P., Witte, T. K., Goodwin, N., Bartlett, M. L., Siegfried, N., Eddy, K. T., Thomas, J. J., Franko, D. L., & Smith, A. R. (2016). Associations between eating disorder symptoms and suicidal ideation through thwarted belongingness and perceived burdensomeness among eating disorder patients. *Journal of Affective Disorders*, 195, 127–135. <https://doi.org/10.1016/j.jad.2016.02.017>
- Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological Science*, 13(2), 172–175. <https://doi.org/10.1111/1467-9280.00431>
- Furrow, J., Palmer, G., Johnson, S., Faller, G., & Palmer-Olsen, L. (2019). *Emotionally focused family therapy restoring connection and promoting resilience*. Routledge.



- Gradus, J. L., Suvak, M. K., Wisco, B. E., Marx, B. P., & Resick, P. A. (2013). Treatment of posttraumatic stress disorder reduces suicidal ideation. *Depression and Anxiety, 30*, 1046–1053. <https://doi.org/10.1002/da.22117>
- Green, K. L., Brown, G. K., Jager-Hyman, S., Cha, J., Steer, R. A., & Beck, A. T. (2015). The predictive validity of the beck depression inventory suicide item. *The Journal of Clinical Psychiatry, 76*(12), 1683–1686. <https://doi.org/10.4088/JCP.14m09391>
- Grunewald, W., Troop-Gordon, W., & Smith, A. R. (2022). Relationships between eating disorder symptoms, muscle dysmorphia symptoms, and suicidal ideation: A random intercepts cross-lagged panel approach. *International Journal of Eating Disorders, 55*(12), 1733–1743. <https://doi.org/10.1002/eat.23819>
- Gysin-Maillart, A., Schwab, S., Soravia, L., Megert, M., & Michel, K. (2016). A novel brief therapy for patients who attempt suicide: A 24-months follow-up randomized controlled study of the Attempted Suicide Short Intervention Program (ASSIP). *PLOS Medicine, 13*(3), Article e1001968. <https://doi.org/10.1371/journal.pmed.1001968>
- Hatch, A., Madden, S., Kohn, M. R., Clarke, S., Touyz, S., Gordon, E., & Williams, L. M. (2009). In first presentation adolescent anorexia nervosa, do cognitive markers of underweight status change with weight gain following a refeeding intervention? *International Journal of Eating Disorders, 43*, 295–306. <https://doi.org/10.1002/eat.20695>
- Hayes, A. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). The Guilford Press.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy: The process and practice of mindful change*. The Guilford Press.
- Jenkins, P. E., & Rienecke, R. D. (2022). Structural validity of the Eating Disorder Examination–Questionnaire: A systematic review. *International Journal of Eating Disorders, 55*(8), 1012–1030. <https://doi.org/10.1002/eat.23721>
- Jobs, D. A. (2012). The Collaborative Assessment and Management of Suicidality (CAMS): An evolving evidence-based clinical approach to suicidal risk. *Suicide and Life-Threatening Behavior, 42*(6), 640–653. <https://doi.org/10.1111/J.1943-278X.2012.00119.X>
- Jobs, D. A. (2016). *Managing suicidal risk* (2nd ed.). The Guilford Press.
- Jobs, D. A. (2023). *Managing suicidal risk* (3rd ed.). The Guilford Press.
- Jobs, D. A., Au, J. S., & Siegelman, A. (2015). Psychological approaches to suicide treatment and prevention. *Current Treatment Options in Psychiatry, 2*(4), 363–370. <https://doi.org/10.1007/s40501-015-0064-3>
- Jobs, D. A., & Joiner, T. E. (2019). Reflections on suicidal ideation. *Crisis, 40*(4), 227–230. <https://doi.org/10.1027/0227-5910/a000615>
- Johnson, C. M., Holmes, S. C., Suvak, M. K., Song, J., Shields, N., Lane, J. E. M., Sijercic, I., Cohen, Z. D., Stirman, S. W., & Monson, C. M. (2021). The effect of PTSD symptom change on suicidal ideation in a combined military and civilian sample engaged in cognitive processing therapy. *Behavior Therapy, 52*(3), 774–784. <https://doi.org/10.1016/j.beth.2020.10.001>
- Joiner, T. E., Robison, M., McClanahan, S., Riddle, M., Manwaring, J., Rienecke, R. D., Le Grange, D., Duffy, A., Mehler, P. S., & Blalock, D. V. (2022). Eating disorder behaviors as predictors of suicidal ideation among people with an eating disorder. *International Journal of Eating Disorders, 55*(10), 1352–1360. <https://doi.org/10.1002/eat.23770>
- Joiner, T. E., Van Orden, K. A., Witte, T. K., Selby, E. A., Ribeiro, J. D., Lewis, R., & Rudd, M. D. (2009). Main predictions of the interpersonal–psychological theory of suicidal behavior: Empirical tests in two samples of young adults. *Journal of Abnormal Psychology, 118*(3), 634–646. <https://doi.org/10.1037/a0016500>
- Kalmbach, D. A., Cheng, P., Ahmedani, B. K., Peterson, E. L., Reffi, A. N., Sagong, C., Seymour, G. M., Ruprich, M. K., & Drake, C. L. (2022). Cognitive-behavioral therapy for insomnia prevents and alleviates suicidal ideation: Insomnia remission is a suicidolytic mechanism. *Sleep, 45*(12), Article zsac251. <https://doi.org/10.1093/sleep/zsac251>
- Kambanis, P. E., Harshman, S. G., Kuhnle, M. C., Kahn, D. L., Dreier, M. J., Hauser, K., Slattery, M., Becker, K. R., Breithaupt, L., Misra, M., Micali, N., Lawson, E. A., Eddy, K. T., & Thomas, J. J. (2022). Differential comorbidity profiles in avoidant/restrictive food intake disorder and anorexia nervosa: Does age play a role? *International Journal of Eating Disorders, 55*(10), 1397–1403. <https://doi.org/10.1002/eat.23777>
- Keel, P. K., Dorner, D. J., Eddy, K. T., Franko, D., Charatan, D. L., & Herzog, D. B. (2003). Predictors of mortality in eating disorders. *Archives of General Psychiatry, 60*(2), 179–183. <https://doi.org/10.1001/archpsyc.60.2.179>
- Klump, K. L., Bulik, C. M., Kaye, W. H., Treasure, J., & Tyson, E. (2009). Academy for eating disorders position paper: Eating disorders are serious mental illnesses. *International Journal of Eating Disorders, 42*(2), 97–103. <https://doi.org/10.1002/eat.20589>
- Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: A new depression diagnostic and severity measure. *Psychiatric Annals, 32*(9), 509–515. <https://doi.org/10.3928/0048-5713-20020901-06>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606–613. <https://doi.org/10.1046/J.1525-1497.2001.016009606.X>
- Kwan, M. Y., Gordon, K. H., Carter, D. L., Minnich, A. M., & Grossman, S. D. (2017). An examination of the connections between eating disorder symptoms, perceived burdensomeness, thwarted belongingness, and suicide risk among undergraduate students. *Suicide and Life-Threatening Behavior, 47*(4), 493–508. <https://doi.org/10.1111/sltb.12304>
- Labouliere, C. D., Vasan, P., Kramer, A., Brown, G., Green, K., Rahman, M., Kammer, J., Finnerty, M., & Stanley, B. (2018). “Zero suicide”—A model for reducing suicide in United States behavioral healthcare. *Suicidology, 23*(1), 22–30.
- Lieberman, A., Gai, A. R., Rogers, M. L., Jobs, D. A., David Rudd, M., Chalker, S. A., Brenner, J. T., & Joiner, T. E. (2023). Targeting perceived burdensomeness to reduce

- suicide risk. *Behavior Therapy*, 54(4), 696–707. <https://doi.org/10.1016/j.beth.2022.12.002>
- Linehan, M. M. (1993). *Skills training manual for treating borderline personality disorder*. The Guilford Press.
- Linehan, M. M. (2015). *Skills training manual for treating borderline personality disorder: DBT skills training manual*. The Guilford Press.
- Louzon, S. A., Bossarte, R., McCarthy, J. F., & Katz, I. R. (2016). Does suicidal ideation as measured by the PHQ-9 predict suicide among VA patients? *Psychiatric Services*, 67(5), 517–522. <https://doi.org/10.1176/appi.ps.201500149>
- Malson, H., Bailey, L., Clarke, S., Treasure, J., Anderson, G., & Kohn, M. (2011). Un/imaginable future selves: A discourse analysis of in-patients' talk about recovery from an 'eating disorder.' *European Eating Disorders Review*, 19(1), 25–36. <https://doi.org/10.1002/erv.1011>
- Michel, K., & Gysin-Maillart, A. (2015). *ASSIP—Attempted suicide short intervention program: A manual for clinicians*. Hogrefe Publishing.
- Mond, J. M., Hay, P. J., Rodgers, B., & Owen, C. (2006). Eating Disorder Examination Questionnaire (EDE-Q): Norms for young adult women. *Behaviour Research and Therapy*, 44(1), 53–62. <https://doi.org/10.1016/j.brat.2004.12.003>
- Mournet, A. M., Smith, J. T., Bridge, J. A., Boudreaux, E. D., Snyder, D. J., Claassen, C. A., Jobes, D. A., Pao, M., & Horowitz, L. M. (2021). Limitations of screening for depression as a proxy for suicide risk in adult medical inpatients. *Journal of the Academy of Consultation-Liaison Psychiatry*, 62(4), 413–420. <https://doi.org/10.1016/j.jaclp.2021.02.002>
- Murphy, R., Straebler, S., Cooper, Z., & Fairburn, C. G. (2010). Cognitive behavioral therapy for eating disorders. *Psychiatric Clinics of North America*, 33(3), 611–627. <https://doi.org/10.1016/j.psc.2010.04.004>
- Na, P. J., Yaramala, S. R., Kim, J. A., Kim, H., Goes, F. S., Zandi, P. P., Vande Voort, J. L., Sutor, B., Croarkin, P., & Bobo, W. V. (2018). The PHQ-9 Item 9 based screening for suicide risk: A validation study of the Patient Health Questionnaire (PHQ)-9 Item 9 with the Columbia Suicide Severity Rating Scale (C-SSRS). *Journal of Affective Disorders*, 232, 34–40. <https://doi.org/10.1016/j.jad.2018.02.045>
- Nock, M. K., Borges, G., Bromet, E. J., Alonso, J., Angermeyer, M., Beautrais, A., Bruffaerts, R., Chiu, W. T., de Girolamo, G., Gluzman, S., de Graaf, R., Gureje, O., Haro, J. M., Huang, Y., Karam, E., Kessler, R. C., Lepine, J. P., Levinson, D., Medina-Mora, M. E., . . . Williams, D. (2008). Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *British Journal of Psychiatry*, 192(2), 98–105. <https://doi.org/10.1192/bjp.bp.107.040113>
- Nuij, C., Van Ballegooijen, W., De Beurs, D., Juniar, D., Erlangsen, A., Portzky, G., O'Connor, R. C., Smit, J. H., Kerkhof, A., & Riper, H. (2021). Safety planning-type interventions for suicide prevention: Meta-analysis. *The British Journal of Psychiatry*, 219(2), 419–426. <https://doi.org/10.1192/BJP.2021.50>
- Ortiz, S. N., & Smith, A. (2020). A longitudinal examination of the relationship between eating disorder symptoms and suicidal ideation. *International Journal of Eating Disorders*, 53(1), 69–78. <https://doi.org/10.1002/eat.23162>
- Patching, J., & Lawler, J. (2009). Understanding women's experiences of developing an eating disorder and recovering: A life-history approach. *Nursing Inquiry*, 16(1), 10–21. <https://doi.org/10.1111/j.1440-1800.2009.00436.x>
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42(1), 185–227. <https://doi.org/10.1080/00273170701341316>
- Rance, N., Moller, N. P., & Clarke, V. (2017). 'Eating disorders are not about food, they're about life': Client perspectives on anorexia nervosa treatment. *Journal of Health Psychology*, 22(5), 582–594. <https://doi.org/10.1177/1359105315609088>
- Robison, M., Rogers, M. L., Robertson, L., Duffy, M. E., Manwaring, J., Riddle, M., Rienecke, R. D., Le Grange, D., Duffy, A., Plotkin, M., Blalock, D. V., Mehler, P. S., & Joiner, T. E. (2022). Avoidant restrictive food intake disorder and suicidal ideation. *Psychiatry Research*, 317, Article 114925. <https://doi.org/10.1016/j.psychres.2022.114925>
- Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1–36. <https://doi.org/10.18637/jss.v048.i02>
- Rudd, M. D., Bryan, C. J., Wertenberger, E. G., Peterson, A. L., Young-McCaughan, S., Mintz, J., Williams, S. R., Arne, K. A., Breitbach, J., Delano, K., Wilkinson, E., & Bruce, T. O. (2015). Brief cognitive-behavioral therapy effects on post-treatment suicide attempts in a military sample: Results of a randomized clinical trial with 2-year follow-up. *American Journal of Psychiatry*, 172(5), 441–449. <https://doi.org/10.1176/appi.ajp.2014.14070843>
- Simon, G. E., Rutter, C. M., Peterson, D., Oliver, M., Whiteside, U., Operskalski, B., & Ludman, E. J. (2013). Does response on the PHQ-9 Depression Questionnaire predict subsequent suicide attempt or suicide death? *Psychiatric Services*, 64(12), 1195–1202. <https://doi.org/10.1176/appi.ps.201200587>
- Smith, A. R., Zuromski, K. L., & Dodd, D. R. (2018). Eating disorders and suicidality: What we know, what we don't know, and suggestions for future research. *Current Opinion in Psychology*, 22, 63–67. <https://doi.org/10.1016/j.copsyc.2017.08.023>
- Spitzer, R. L., Williams, J. B. W., & Kroenke, K. J. (2014). Test review: Patient Health Questionnaire-9 (PHQ-9). *Rehabilitation Counseling Bulletin*, 57(4), 246–248.
- Stanley, B., Brodsky, B., & Monahan, M. (2023). Brief and ultra-brief suicide-specific interventions. *FOCUS*, 21(2), 129–136. <https://doi.org/10.1176/appi.focus.20220083>
- Suokas, J. T., Suvisaari, J. M., Grainger, M., Raevuori, A., Gissler, M., & Haukka, J. (2014). Suicide attempts and mortality in eating disorders: A follow-up study of eating disorder patients. *General Hospital Psychiatry*, 36(3), 355–357. <https://doi.org/10.1016/j.genhosppsych.2014.01.002>
- Thiel, A. M., Spoor, S. P., McGinnis, B. L., & Young, K. P. D. (2023). Examining the association of eating psychopathology with suicidality: Comparing cross-sectional and longitudinal tests of interpersonal-psychological mediators. *Eating Disorders*, 31(4), 320–336. <https://doi.org/10.1080/10640266.2022.2135719>

- Tingley, D., Yamamoto, T., Hirose, K., Keele, L., & Imai, K. (2014). Mediation: R package for causal mediation analysis. *Journal of Statistical Software*, 59(5), 1–38. <https://doi.org/10.18637/jss.v059.i05>
- Trockel, M., Karlin, B. E., Taylor, C. B., Brown, G. K., & Manber, R. (2015). Effects of cognitive behavioral therapy for insomnia on suicidal ideation in veterans. *Sleep*, 38(2), 259–265. <https://doi.org/10.5665/sleep.4410>
- Urban, D., & Mayerl, J. (2006). *Regressionsanalyse: Theorie, technik und anwendung* (Vol. 2). VS Verlag für Sozialwissenschaften.
- van Hoeken, D., & Hoek, H. W. (2020). Review of the burden of eating disorders: Mortality, disability, costs, quality of life, and family burden. *Current Opinion in Psychiatry*, 33(6), 521–527. <https://doi.org/10.1097/YCO.0000000000000641>
- Waller, G., Cordery, H., Corstorphine, E., Hinrichsen, H., Lawson, R., Mountford, V., & Russell, K. (2007). *Cognitive behavioral therapy for eating disorders: A comprehensive treatment guide*. Cambridge University Press.
- Westmoreland, P., Duffy, A., Rienecke, R., Le Grange, D., Joiner, T., Manwaring, J., Watters, A., & Mehler, P. (2022). Causes of death in patients with a history of severe anorexia nervosa. *Journal of Eating Disorders*, 10, Article 200. <https://doi.org/10.1186/s40337-022-00716-5>
- World Health Organization. (2024, August 29). *Suicide*. <https://www.who.int/news-room/fact-sheets/detail/suicide>
- Yip, P. S. F., Caine, E., Yousuf, S., Chang, S., Sen Chien-Chang Wu, K., & Chen, Y.-Y. (2012). Means restriction for suicide prevention. *The Lancet*, 379(9834), 2393–2399. [https://doi.org/10.1016/S0140-6736\(12\)60521-2](https://doi.org/10.1016/S0140-6736(12)60521-2)