

Original Article

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Dynamic associations between interpersonal needs and suicidal ideation in a sample of individuals with eating disorders

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Abstract

Background. Over half of individuals with eating disorders experience suicidal ideation at some point in their lives, yet few longitudinal studies have examined predictors of ideation in this at-risk group. Moreover, prospective research has focused on relatively distal or trait-level factors that are informative for distinguishing who is most at risk but not when. Little is known about more proximal or state-level risk factors that fluctuate within an individual, which is critical for determining when a person is most likely to engage in suicidal behaviors.

Methods. Women ($N = 97$) receiving treatment for their eating disorder completed questionnaires weekly to assess suicidal ideation and interpersonal constructs (i.e. perceived burdensomeness, thwarted belongingness) theorized to be proximal predictors of suicidal desire. Longitudinal multilevel models were conducted to examine both within- and between-person predictors of suicidal ideation across 12 weeks of treatment.

Results. Statistically significant within-person effects for burdensomeness ($\beta = 0.06$; $p < 0.001$) indicate that when individuals have greater feelings of burdensomeness compared to their own average, they also experience higher suicidal ideation. We did not find any significant influence of thwarted belongingness or the interaction between burdensomeness and belongingness on suicidal ideation.

Conclusions. This study was the first to examine dynamic associations between interpersonal constructs and suicidal ideation in individuals with eating disorders. Results are only partially consistent with the Interpersonal Theory of Suicide and suggest that short-term changes in burdensomeness may impact suicidal behavior in individuals with eating disorders.

Individuals with eating disorders are at heightened risk of suicide attempts and death by suicide with levels comparable to or even higher than other psychiatric disorders (Chesney, Goodwin, & Fazel, 2014; Preti, Rocchi, Sisti, Camboni, & Miotto, 2011; Smith, Zuromski, & Dodd, 2018). For example, a meta-analysis of suicide risk in eating disorders noted standardized suicide mortality ratios of 31.0 and 7.5 for anorexia nervosa (AN) and bulimia nervosa (BN), respectively (Preti et al., 2011); in comparison, standardized suicide mortality ratios for schizophrenia and depression have been estimated to be 12.9 and 19.7, respectively (Chesney et al., 2014). Additionally, up to 43% of individuals with eating disorders endorse current suicidal ideation (Smith et al., 2018), which is consistent with that reported for schizophrenia (e.g. 40%; Fenton, McGlashan, Victor, & Blyler, 1997) but lower than that reported for bipolar disorder (e.g. 60%; Valtonen et al., 2005). Given that suicidal ideation is a precursor to more serious forms of suicidality (e.g. suicide attempts), it is imperative to identify factors associated with ideation and implement targeted interventions to reduce risk in this vulnerable population.

A substantial body of research within individuals with eating disorders has identified associations between suicide risk and comorbid psychopathology (e.g. depression, substance use) or specific eating disorder behaviors (e.g. purging) or related impairment (Bodell, Cheng, & Wildes, 2019; Franko et al., 2004; Franko & Keel, 2006; Pisetsky, Thornton, Lichtenstein, Pedersen, & Bulik, 2013). This research has contributed important knowledge on subgroups of individuals most at risk as well as the likelihood that an individual may engage in suicidal behavior several years later. However, the focus on more trait-level factors measured across relatively long time frames (e.g. several months or years) tells us little about *when a specific individual* is most likely to engage in suicidal behaviors, which is essential information for clinicians to prevent the escalation of suicidal behavior in their individual clients (Franklin et al., 2017). Longitudinal designs with multiple assessment points, ideally over relatively short periods of time, are critical for identifying more proximal predictors of risk that can inform specific targets for intervention (Wright & Hopwood, 2016; Wright & Simms, 2016).

The Interpersonal Theory of Suicide (IPTS; Joiner, 2005; Van Orden et al. 2010) has proposed that feeling like a burden to others (perceived burdensomeness) and lacking a sense of

belongingness with others (thwarted belongingness) are necessary, proximal predictors of suicidal ideation. Over the past decade, accumulating research supports this tenet of the IPTS, with a recent meta-analysis demonstrating that both burdensomeness and thwarted belongingness are moderately associated with suicidal ideation ($r = 0.48$ and $r = 0.37$ $ps < 0.001$, respectively; Chu et al., 2017). Notably, however, the IPTS posits that burdensomeness and thwarted belongingness are state-based processes that predict suicidal ideation, but limited research has examined associations between individual variability in these interpersonal constructs and individual variability in suicidality (i.e. within-person predictors of suicide risk; Kleiman et al., 2017). For example, across two samples, Kleiman et al. (2017) found significant associations between hourly fluctuations in suicidal ideation and burdensomeness and loneliness, but only burdensomeness was prospectively associated with suicidal ideation. One limitation of this prior study was the use of single-items to assess these interpersonal constructs. Moreover, although the IPTS posits that burdensomeness and belongingness interact with one another in a synergistic fashion to predict suicide ideation, Kleiman et al. (2017) did not formally test this interaction likely due to limited statistical power and assessment of both constructs only in one sample. Further examination of the role of burdensomeness and belongingness in suicidal ideation across treatment samples is warranted.

In sum, few studies to date have examined within-person fluctuations in burdensomeness and thwarted belongingness and associations with suicidal ideation, and no studies have examined such processes in individuals with eating disorders, who are at an elevated risk for suicide compared to the general population (Preti et al., 2011). Thus, the aims of this study were to use a naturalistic, longitudinal design in individuals receiving treatment for their eating disorder and examine both between- and within-person associations between burdensomeness, belongingness, and suicidal ideation. Based on previous tests and predictions of the IPTS, we hypothesized that individuals with higher levels of burdensomeness and thwarted belongingness would have higher levels of suicidal ideation (between-person main effect) and that on weeks when individuals experienced higher than their average levels of burdensomeness and belongingness, then they would experience more severe suicidal ideation (within-person main effect). We also hypothesized that within-person burdensomeness would interact with within-person belongingness to increase the likelihood of suicidal ideation.

Methods

Participants were 100 women admitted to a residential treatment center in the Southeastern United States who consented to participate in research on eating disorder symptoms and suicidality. All study procedures were approved by the Institutional Review Boards of Florida State University and Auburn University. Participants completed a battery of self-report questionnaires during treatment admission as well as weekly measures throughout treatment. Admission data from this sample have been published previously (Dodd et al., 2018; Forrest et al., 2016; Smith et al., 2016; Witte et al., 2016; Zuromski et al., 2015), but longitudinal aims and analyses are unique for this study (Velkoff & Smith, 2019).

Of the 100 participants who signed consent, 97 had at least two follow-up assessments and were included in the current study. Of those included in the current study, ~80% ($n = 78$)

were in residential treatment and 17.5% ($n = 17$) were in partial hospitalization. Eating disorder diagnoses based on DSM-5 criteria were derived from clinician-interview data during patients' intake assessments. Diagnoses were reviewed by multiple doctoral-level researchers who reached consensus on all final diagnoses (Witte et al., 2016). Thirty-three participants (34.0%) met diagnostic criteria for AN, 15 of whom were identified as the binge-eating/purging subtype. Twenty-seven participants (27.8%) met diagnostic criteria for BN, one participant (1.0%) met criteria for binge eating disorder, 29 (29.9%) met criteria for other specified feeding or eating disorder (OSFED), and seven (7.2%) were determined to have an unspecified feeding or eating disorder. The OSFED group included five individuals with atypical AN, 14 individuals with subthreshold BN (i.e. low frequency of behaviors or limited duration of illness), and 10 individuals with purging disorder (i.e. engaged in purging behaviors in the absence of binge eating). Individuals in the unspecified group included anyone else who did not fit within any other diagnostic category. The racial breakdown of the sample is as follows: 93.8% ($n = 91$) identified as White/Caucasian, 2.1% ($n = 2$) identified as Black or African American, and 1% ($n = 2$) identified as American Indian or Pacific Islander, respectively.^{1†} Only two participants (2.1%) identified as Hispanic or Latina. The average age was 26.7 (s.d. = 7.6; range = 18–58). The average length of treatment was ~10 weeks (mean = 9.99, s.d. = 5.32) with treatment lengths ranging from 2 to 30 weeks. Only 33 participants (34.0%) continued in treatment for longer than 3 months; therefore, associations between suicidal ideation and interpersonal needs were examined across the first 12 weeks of treatment.

Baseline measures

Eating disorder symptoms

The Eating Disorders Examination Questionnaire (EDEQ; Fairburn and Belgin, 1994) was administered at treatment admission to assess eating disorder symptoms and severity. The EDEQ is a 28-item self-report questionnaire that includes four subscales (dietary restraint, eating concerns, shape concerns, and weight concerns) that are averaged together to determine a global score. Because this questionnaire was only administered at treatment admission, the global score was used as a time-invariant covariate in statistical models to control for the potential impact of baseline eating disorder severity on suicidal ideation. Internal consistency for the subscale scores was good ($\alpha = 0.80$ to 0.90).

Depression

The Beck Depression Inventory-Second Edition (BDI-II; Beck, Steer, & Brown, 1996) is a well-validated self-report assessment of symptoms of depression. The BDI-II was administered as part of the clinical intake questionnaire battery, and because it was available only at one time point, it was used as a time-invariant covariate in analyses examining associations between interpersonal needs constructs and suicidal ideation. Cronbach's α in the current study was good ($\alpha = 0.94$).

Body mass index (BMI)

Participants' BMI (kg/m^2) was calculated using objectively measured height (m) and weight (kg). BMI at admission was included as a covariate.

[†]The notes appear after the main text.

Weekly measures

Suicidal ideation

The Depressive Symptoms Inventory Suicidality Subscale (DSI-SS; Metalsky & Joiner, 1997) is a 4-item measure used to assess suicidal ideation and related behaviors. Each item is scored on a 4-point scale ranging from 0 (*I do not have thoughts of killing myself*) to 3 (*I always have thoughts of killing myself*), with each item summed to yield a total score. Participants were instructed to “pick out the statement in each group of statements that describes you best for the past week.” In addition to assessing frequency of thoughts about killing oneself, items ask about formulation of plans for suicide, control over one's thoughts about suicide, and impulses to kill oneself. This measure has been used in a variety of studies and populations to assess suicide risk (Joiner, Pfaff, & Acres, 2002; Ribeiro, Bodell, Hames, Hagan, & Joiner, 2013) and demonstrated high internal consistency in the current study with Cronbach's α ranging from 0.81 (week 12) to 0.97 (week 9).

Interpersonal needs

The Interpersonal Needs Questionnaire (INQ; Van Orden, Cukrowicz, Witte, and Joiner, 2012) was used to assess weekly perceived burdensomeness and thwarted belongingness. The INQ is a 15-item self-report questionnaire scored from 0 (not at all true for me) to 6 (very true for me). Nine items are summed to assess the construct of thwarted belongingness and six items are summed to assess perceived burdensomeness. Sample items for thwarted belongingness include *These days, I feel disconnected from other people* and *These days, I am close to other people* (reverse scored). Sample items for perceived burdensomeness include *These days I think my death would be a relief to the people in my life* and *These days the people in my life would be better off if I were gone*. This measure has demonstrated good internal consistency and convergent and discriminant validity (Van Orden et al., 2012). In the current study, internal consistency for the perceived burdensomeness and thwarted belongingness scales was good (Cronbach's α range: 0.92 to 0.96 for perceived burdensomeness; 0.79 to 0.86 for thwarted belongingness).

Statistical analyses

Longitudinal multilevel models in which observations were nested within individuals were conducted using the Statistical Package for the Social Sciences (SPSS, Version 24) to examine associations between suicidal ideation and thwarted belongingness and perceived burdensomeness over the course of treatment. First, empty means, random intercept models were conducted to examine the intraclass correlations (ICC) for suicidal ideation, perceived burdensomeness, and thwarted belongingness. The ICC was calculated as between-person variance ($\tau^2 u_0$) divided by between-person ($\tau^2 u_0$) plus within-person variance (σ_e^2) and was used to assess the degree of variability in suicidal ideation and proposed predictors (perceived burdensomeness and thwarted belongingness) (Hoffman, 2015). Next, in a series of unconditional models, we tested whether suicidal ideation, burdensomeness, or thwarted belongingness demonstrated any systematic change over treatment (Hoffman, 2015). We specified both linear and nonlinear (quadratic) growth processes with time coded as the number of weeks since admission for each assessment point. Time was centered such that zero reflected treatment admission (the baseline assessment).

To assess whether within-person fluctuations in perceived burdensomeness and thwarted belongingness co-occur with fluctuations in suicidal ideation, interpersonal needs variables were person-mean-centered, such that within-person (level-1) effects were represented by the deviation from the person's mean burdensomeness or thwarted belongingness, respectively, across weeks in treatment. Between-person (level-2) effects were represented by the person's mean burdensomeness or thwarted belongingness across weeks centered at the sample average (across all participants and time points). The prediction of weekly suicidal ideation from time-varying predictors (burdensomeness and thwarted belongingness) was then examined. We examined both the main effects of each of these variables as well as their interaction on suicidal ideation, which is the most direct test of the IPTS. Baseline BMI, BDI, and EDEQ global scores were added as level-2 covariates in subsequent models to examine whether any significant associations between interpersonal needs and suicidal ideation held while accounting for these covariates. These level-2 variables were centered at the sample average prior to being included in the models.

In order to explore temporal associations between interpersonal constructs and suicidal ideation, we also conducted time-lagged analyses to test whether burdensomeness and thwarted belongingness predicted severity of suicidal ideation in the subsequent week. These multilevel models were identical to analyses described above except that each interpersonal need construct was linked to suicidal ideation at the subsequent time point.

Missing data

At admission, 2.1, 12.4, and 13.4%, of data were missing for BDI, EDEQ, and BMI, respectively. Estimation maximization procedures were used to impute missing values. Of the participants still in treatment, the percentage of missing data on any weekly measure (interpersonal constructs, suicidal ideation) ranged from 0% (weeks 11, 12) to 9.5% (week 6). All multilevel models were estimated using maximum likelihood.

Results

Means and standard deviations of study variables are included in Table 1. The percentage of the sample who endorsed any suicidal ideation ranged from 52.3% (treatment admission) to 18.6% (week 9). Over the course of treatment, 43.3% ($n = 42$) of participants denied any suicidal ideation. There were no mean differences in burdensomeness, thwarted belongingness, or suicidal ideation across the different eating disorder diagnostic categories at admission. Given the non-normal distribution of suicidal ideation (i.e. skewness ranging from 1.22 to 2.90; kurtosis ranging from 0.64 to 9.99), a square root transformation was employed, which reduced skewness and kurtosis to acceptable levels at all time points (i.e. skewness ranging from 0.47 to 1.88; kurtosis ranging from -1.29 to 2.05). Models were run using both transformed and non-transformed outcome variables. Findings were consistent across models; thus, analyses using non-transformed variables are reported to ease interpretation of findings.²

Unconditional models characterizing change in suicidal ideation across treatment

Results from the empty means models indicated that the ICC for suicidal ideation was 0.73, such that ~73% of the variance in suicidal ideation was due to between-person mean differences, and

Table 1. Means and standard deviations for study variables

	Admission N = 97	W1 N = 97	W2 N = 97	W3 N = 92	W4 N = 82	W5 N = 71	W6 N = 63	W7 N = 61	W8 N = 52	W9 N = 43	W10 N = 35	W11 N = 32	W12 N = 28
	Mean (s.d.)												
Suicidal Ideation	1.86 (2.43)	1.15 (2.23)	0.86 (1.84)	1.08 (2.41)	1.04 (2.26)	1.20 (2.34)	1.11 (2.32)	0.77 (1.67)	0.96 (2.10)	1.00 (2.34)	1.37 (2.44)	1.41 (2.60)	1.43 (2.44)
Any suicidal ideation (%)	52.3%	28.7%	25.8%	23.6%	26.9%	30.4%	27.0%	26.2%	25.0%	18.6%	28.6%	31.2%	35.7%
Perceived Burdensomeness	14.17 (10.00)	13.32 (10.72)	12.77 (9.51)	13.77 (9.96)	13.01 (10.90)	13.98 (10.78)	14.16 (11.09)	12.34 (10.16)	12.79 (10.36)	13.42 (10.52)	15.16 (10.40)	12.75 (10.79)	15.61 (11.39)
Thwarted Belongingness	24.65 (10.27)	26.13 (9.73)	25.42 (9.93)	25.02 (10.74)	23.77 (9.78)	23.58 (9.63)	25.30 (9.44)	22.68 (9.48)	22.19 (9.55)	24.60 (9.06)	25.94 (9.48)	22.66 (9.13)	23.79 (9.20)
EDEQ	4.11 (1.25)												
BMI	20.17 (3.95)												
BDI	31.87 (13.24)												

BDI, Beck Depression Inventory; BMI, body mass index; EDEQ, Eating Disorder Examination Questionnaire; s.d., standard deviation; W, week in treatment.

27% of its variance was due to within-person variation around the person means across weeks (Table 2). Perceived burdensomeness and thwarted belongingness also demonstrated a majority of variance due to between-person mean differences with 20% and 32% of variance in these variables due to within-person variation, respectively [ICC burdensomeness = $\tau^2 u_0$ (84.97)/ $\tau^2 u_0$ (84.97) + σ_e^2 (20.76) = 0.80; ICC belongingness = $\tau^2 u_0$ (66.20)/ $\tau^2 u_0$ (66.20) + σ_e^2 (30.48) = 0.68].

Table 2 includes results from the unconditional models describing the change in suicidal ideation across treatment. Results from unconditional models describing the change in burdensomeness and thwarted belongingness across treatment are included in online Supplementary Tables S1 and S2. The parameters of the best-fitting model for suicidal ideation included a significant linear and quadratic effect of time and significant variances for the random linear and quadratic time slopes. Estimates suggest that suicidal ideation decreased significantly from admission but that the rate of decrease slowed down over time (Table 2). Allowing variance for the random quadratic time slope significantly improved model fit [$-2\Delta LL(\sim 3) = 52.5$, $p < 0.001$; with smaller AIC and BIC], indicating significant individual differences in change in suicidal ideation over time. Given the significant influence of time on suicidal ideation, both linear (time) and quadratic (time \times time) fixed effects of time were included in the main analyses.

Conditional models examining associations between interpersonal constructs and suicidal ideation

The addition of between- and within-person effects of perceived burdensomeness and thwarted belongingness to the best fitting baseline model indicated a significant between-person effect of burdensomeness on suicidal ideation such that individuals who reported higher levels of perceived burdensomeness on average also reported higher mean symptoms of suicidal ideation [$B(s.e.) = 0.13(0.03)$, $p < 0.001$; Table 3]. This effect explained ~30% of the variance in between-person differences in suicidal ideation (Level 2 Pseudo-STD = 0.31; Hoffman, 2015). There also was a significant within-person effect such that reporting greater burdensomeness than usual was associated with greater suicidal ideation in that same week [$B(s.e.) = 0.06(0.01)$, $p < 0.001$; Table 3]. Weekly within-person fluctuations in perceived burdensomeness accounted for ~4% of within-person variation in suicidal ideation (Level 1 Pseudo-STD = 0.05; Hoffman, 2015). Neither between- nor within-person effects of belongingness were associated with suicidal ideation (Table 3). Moreover, when the interaction between within-person burdensomeness and within-person thwarted belongingness was added to the model, it was not associated with suicidal ideation [$B(s.e.) = 0.0002(0.001)$, $p = 0.89$; online Supplementary Table S3].

Results were similar for time-lagged analyses, such that levels of burdensomeness, but not thwarted belongingness, significantly predicted suicidal ideation at the subsequent week [$B(s.e.) = 0.03(0.01)$, $p = 0.003$; Table 4]. Notably, all of the main effects of burdensomeness on suicidal ideation remained statistically significant after accounting for the BMI at admission as well as baseline eating disorder and depressive symptoms (online Supplementary Tables 4–6).

Finally, exploratory analyses examined whether suicidal ideation itself predicted burdensomeness. Results indicated a reciprocal relationship between ideation and burdensomeness such that within-person levels of suicidal ideation at one week significantly

Table 2. Model parameters for unconditional models estimating change in suicidal ideation across assessment points

Model parameters	Empty means, random intercept			Fixed linear time, random intercept			Random linear time			Fixed quadratic, random linear time			Random quadratic time ^a		
	<i>B</i>	s.e.	<i>p</i>	<i>B</i>	s.e.	<i>p</i>	<i>B</i>	s.e.	<i>p</i>	<i>B</i>	s.e.	<i>p</i>	<i>B</i>	s.e.	<i>p</i>
Model for the means															
γ_{00} Intercept	1.18	0.20	<0.001	1.26	0.21	<0.001	1.28	0.20	<0.001	1.53	0.21	<0.001	1.52	0.22	<0.001
γ_{10} Linear time				-0.02	0.01	0.18	-0.03	0.02	0.23	-0.19	0.04	<0.001	-0.19	0.06	0.003
γ_{20} Quadratic time										0.02	0.004	<0.001	0.02	0.005	0.002
Model for the variance															
$\tau^2 u_0$ Intercept variance	3.79	0.57	<0.001	3.78	0.57	<0.001	3.53	0.57	<0.001	3.53	0.57	<0.001	4.24	0.70	<0.001
$\tau^2 u_1$ Linear slope variance							0.02	0.01	0.001	0.02	0.01	0.001	0.25	0.06	<0.001
$\tau^2 u_2$ Quadratic slope variance													0.001	0.00	<0.001
σ_e^2 Residual variance	1.38	0.07	<0.001	1.37	0.07	<0.001	1.16	0.07	<0.001	1.12	0.06	<0.001	0.95	0.06	<0.001
Model fit (ML)															
Parameters	3			4			6			7			10		
-2LL	2898.79			2896.99			2848.39			2826.91			2774.40		
AIC	2904.79			2904.99			2860.39			2840.91			2794.40		
BIC	2918.93			2923.84			2888.67			2873.90			2841.53		

ML, maximum likelihood; s.e., standard error.

Notes: Bold values are $p < 0.05$.^aDetermined to be best fitting model.

Table 3. Multilevel model examining the concurrent relationship between interpersonal needs constructs and suicidal ideation across treatment

Variable	<i>B</i>	s.e.	<i>p</i>	95% CI (<i>B</i>)
Intercept	1.49	0.19	<0.001	1.11–1.88
Time	–0.16	0.06	0.008	–0.27 to –0.04
Time × time	0.01	0.005	0.003	0.01–0.02
Burdensomeness _{between–subjects}	0.13	0.03	<0.001	0.08–0.19
Burdensomeness _{within–subjects}	0.06	0.01	<0.001	0.04–0.08
Belongingness _{between–subjects}	–0.02	0.03	0.44	–0.08 to 0.03
Belongingness _{within–subjects}	0.01	0.01	0.12	–0.003 to 0.03

CI, confidence interval; s.e., standard error.

Notes: Time refers to the linear fixed effect of time or slope (e.g. linear change in suicidal ideation over time). Time × time refers to the quadratic effect of time, which provides information on the rate of change in the slope. 'Burdensomeness' refers to the Perceived Burdensomeness subscale of the INQ, with higher scores indicating greater perceived burdensomeness. 'Belongingness' refers to the Thwarted Belongingness subscale of the INQ, with higher scores indicating greater thwarted belongingness (e.g. loneliness).

Table 4. Multilevel model examining the prospective relationship between interpersonal needs constructs and suicidal ideation

Variable	<i>B</i>	s.e.	<i>p</i>	95% CI (<i>B</i>)
Intercept	1.23	0.21	<0.001	0.81–1.65
Time	–0.07	0.06	0.26	–0.19 to 0.05
Time × time	0.01	0.005	0.08	–0.001 to 0.02
Burdensomeness _{between–subjects} (lag)	0.13	0.03	<0.001	0.08–0.18
Burdensomeness _{within–subjects} (lag)	0.03	0.01	0.003	0.01–0.05
Belongingness _{between–subjects} (lag)	–0.01	0.03	0.66	–0.07 to 0.05
Belongingness _{within–subjects} (lag)	–0.002	0.01	0.78	–0.02 to 0.01

CI, confidence interval; s.e., standard error.

Notes: Time refers to the linear fixed effect of time and time × time refers to the quadratic fixed effect of time. 'Burdensomeness' refers to the Perceived Burdensomeness subscale of the INQ, with higher scores indicating greater perceived burdensomeness. 'Belongingness' refers to the Thwarted Belongingness subscale of the Interpersonal Needs Questionnaire, with higher scores indicating greater thwarted belongingness (e.g. loneliness).

predicted burdensomeness at the subsequent week [$B(s.e.) = 0.29(0.14)$, $p = 0.04$], while accounting for covariates (online Supplementary Table S7).

Discussion

To our knowledge, this study was the first to examine change in suicidal ideation over the course of eating disorder treatment as well as between- and within-person predictors of suicidal ideation over a relatively short time frame in a sample of individuals with eating disorders. In general, we noted a decrease in suicidal ideation over the course of treatment, with the rate of decrease slowing down after treatment admission. Although findings could represent regression to the mean, they suggest that intensive treatment for one's eating disorder could help reduce the severity of suicidal ideation, especially if suicidal ideation is targeted in treatment.

Consistent with prior literature on the IPTS (Chu et al., 2017), individual differences in perceived burdensomeness explained substantial variation in suicidal ideation across individuals. Extending this prior body of work, we also found that within-person fluctuations in burdensomeness were significantly associated with within-person variation in suicidal ideation. In general, results extend those of Kleiman et al. (2017) who found co-occurrence between burdensomeness, loneliness (cf thwarted belongingness), and suicidal ideation in a psychiatric inpatient ($N = 36$) and community-based sample ($N = 54$) to an

independent sample of women with eating disorders and to a time-frame consistent with outpatient treatment (i.e. weekly sessions). Indeed, both studies found that burdensomeness, but not thwarted belongingness, was associated with suicidal ideation in prospective analyses, further highlighting the relative importance of this interpersonal construct.

In contrast to the IPTS, we did not find a significant interaction between burdensomeness and belongingness on suicidal ideation. However, this result is consistent with other recent studies that have failed to find a synergistic effect of burdensomeness and thwarted belongingness on suicidal ideation in prospective studies (Miller, Esposito-Smythers, & Leichtweis, 2016; Roeder & Cole, 2019; Teismann et al., 2017). Taken together, our findings suggest that among women with eating disorders, perceived burdensomeness may be an important variable for determining both who may be most at risk for suicidal ideation (i.e. between-person effects) as well as when a particular individual may experience heightened ideation compared to their baseline (i.e. within-person effects). Notably, we also found support for a reciprocal relationship between burdensomeness and suicidal ideation, suggesting that having thoughts about suicide may contribute to one's perceptions of being a burden on others. This finding is consistent with recent studies noting bi-directional effects of interpersonal constructs and suicidal ideation in psychiatric inpatients assessed over three days (Kyron, Hooke, & Page, 2018) and in adults assessed on-line six times over 16 days (Rogers & Joiner, 2019).

Although clinically and statistically significant, burdensomeness explained a relatively small portion of the within-person variance in suicidal ideation. This finding may be due, in part, to the moderate stability in this interpersonal construct across each week. Indeed, Kleiman et al. (2017) noted that ~42% to 51% of variability in burdensomeness and loneliness, respectively, in their community sample and 39% of variability in loneliness in their psychiatric inpatient sample was due to within-person variance, which is higher than that found for the current study (i.e. 20% and 32%). Thus, these constructs may be relatively stable from week to week but vary more significantly across shorter time periods. It is also possible that the structured treatment settings may have led to more consistent interpersonal interactions (e.g. with other patients and staff) and contributed to reduce within-person variability in the interpersonal constructs.

We also found lower within-person variability in suicidal ideation (e.g. 27%) compared to Kleiman et al. (2017; e.g. 33–50%). These differences may reflect differences in the time-frame by which ideation was assessed, as the weekly suicidal ideation measured in the current study may reflect a different phenomenon that was captured in this prior study. Indeed, participants may be less accurate at estimating their average level of suicidal ideation over the past week, particularly given evidence of the dynamic daily fluctuations in suicidal ideation (Kleiman et al., 2017), and it is possible that psychological processes differentially contribute to weekly *v.* daily or hourly fluctuations in ideation. Thus, future studies should consider additional factors (e.g. sleep quality, daily stressors) that may contribute to individual variation in suicidal ideation between weekly treatment sessions in order to have a larger impact on decreasing risk of future suicidal behavior.

Overall, this study adds to the literature on the IPTS with particular relevance to clinicians tasked with identifying and minimizing risk for suicidality. Results further underscore the need for ongoing assessment of suicide risk in eating disorder populations, especially given over 50% of the current sample endorsed suicidal ideation at treatment admission. Strengths of the study include the relatively large clinical sample of individuals with eating disorders and longitudinal design with weekly assessment of suicidal ideation and interpersonal needs. Although the weekly time frame is a strength in that it maps onto when patients are typically seen in outpatient clinical settings, we may have missed important fluctuations in ideation or interpersonal needs constructs that could have occurred over a more narrow time frame (e.g. hours, days; Kleiman et al., 2017). Moreover, given the literature indicating an increased risk of suicide following hospitalization, this study likely missed an important window in which to examine interpersonal factors and suicide risk in eating disorders. Due to the small sample sizes for each diagnostic group and lack of *a priori* hypotheses about why diagnostic groups would differ, we did not run analyses separately for eating disorder diagnoses. Other limitations include the lack of formal psychometric data confirming reliability or validity of the eating disorder diagnoses. We also only had data from the EDE-Q and BDI at treatment admission and discharge; thus, we were unable to include eating disorder or depressive symptom severity as time-varying predictors. Finally, results may not generalize to other populations of individuals with suicidal ideation or other samples of individuals with eating disorders and require replication in more diverse samples and across all levels of care.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/S0033291720000276>

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Ethical standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Notes

1 Two participants were missing data for level of care and demographic information.

2 Tables that include results of data using square-root transformed outcome variables are available upon request. The pattern of results was the same with the transformed and non-transformed outcome variable.

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