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Proximal Correlates of Suicidal Ideation and Behaviors: A Test of the Interpersonal-Psychological Theory of Suicide

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Abstract

Objective: The interpersonal-psychological theory of suicide hypothesizes proximal causes of suicidal ideation and behaviors; however, past studies have generally tested distal relations. The present study tested the proximal nature of the theory's hypotheses.

Methods: A repeated-measures design collected daily survey data on the theory constructs over 90 days from 206 (150 women) college students with previous histories of suicidal ideation. Participants completed 7,342 (39.6%) of the 18,540 surveys sent.

Results: Thwarted belongingness and perceived burdensomeness both positively associated with passive suicidal ideation at the daily level. A statistical trend revealed that perceived burdensomeness was associated with daily active suicidal ideation only at high levels of thwarted belongingness and hopelessness. Active suicidal ideation, but not capability for suicide, was positively associated with suicidal behavior at the daily level.

Conclusions: These results support the theory's predictions regarding passive and active suicidal ideation, with limited support regarding suicidal behaviors. The proximal associations of the IPTS constructs with daily suicidal ideation suggest areas for potential intervention with suicidal clients.

Suicide is a substantial public health concern and is the third leading cause of death in young adults aged 18–24 years old in the United States (Centers for Disease Control & Prevention, National Center for Injury Prevention & Control, 2013). College students are a subsample of the young adult population who are especially vulnerable to suicide, as it is a leading cause

of death on college campuses (Turner, Leno, & Keller, 2013). Many college students engage in suicidal ideation, with approximately half of college students having thought about suicide in their lifetime and 12% experiencing suicidal ideation during college (Drum, Brownson, Burton Denmark, & Smith, 2009; Wilcox, Arria, Caldeira, Vincent, Pinchevsky, & O'Grady, 2010). Suicidal behaviors among college students are also of concern, with 10% attempting suicide in their lifetime and 2% attempting suicide each year (Kisch, Leino, & Silverman, 2005; Meehan, Lamb, Saltzman, & O'Carroll, 1992). These prevalence rates highlight the need for theory-guided research to improve risk identification and intervention within this population.

Seeking to improve suicide risk identification, suicide theorists began to articulate “ideation-to-action” frameworks that include distinct mechanisms in the development of suicidal ideation and suicide attempts (e.g., Joiner, 2005; Klonsky & May, 2015). The *interpersonal-psychological theory of suicide* (IPTS; Joiner, 2005; Van Orden et al., 2010) represents the first theory to describe separate, but related, processes that lead to passive suicidal ideation, active suicidal ideation, suicidal intent, and a suicide attempt. First, the theory posits that passive suicidal ideation (i.e., the wish to be dead) results from thwarted belongingness (i.e., social disconnectedness and low reciprocal care) and/or perceived burdensomeness (i.e., self-hatred and liability; Joiner, 2005; Van Orden et al., 2010). Second, active suicidal ideation—characterized by a desire to attempt suicide—emerges when one feels hopeless about the resolution of these states (Van Orden et al., 2010). Third, active suicidal ideation does not transition to suicidal intent (i.e., I will kill myself) unless one can overcome the fear of death, and such intent does not result in an attempt unless one has the pain tolerance to do so. That is, in addition to active suicidal ideation, one must have both fearlessness about death and physical pain tolerance to attempt suicide—termed the capability for suicide. This capability for suicide is theorized to be partly heritable and partly acquired via habituation processes in response to repeated physically painful and fearsome events (e.g., violence, self-harm; Smith & Cukrowicz, 2010; Van Orden et al., 2010).

The IPTS received substantial empirical attention (Hjelmeland & Loa Knizek, 2018); however, many studies only reported on variants of the theory's hypotheses, and much of the findings are mixed. A systematic review of 66 studies concluded that the relation between perceived burdensomeness and suicidal ideation was the most frequently tested and supported aspect of the theory (Ma, Batterham, Calear, & Han, 2016). The hypothesized interactions that cause active suicidal ideation and suicide attempts received much less empirical investigation and support (Ma et al., 2016). In a meta-analysis including unpublished work, Chu et al., (2017) showed that the interaction of unmet interpersonal needs with hopelessness as a predictor of active suicidal ideation was not frequently tested or supported nor was the interaction between active suicidal ideation and the capability for suicide as a predictor of suicide attempts. Furthermore, both summaries of the literature noted that over 90% of the included studies used cross-sectional design and retrospective recall (Chu et al., 2017; Ma et al., 2016). Among the few longitudinal studies conducted, distal (i.e., weeks, months, years) time frames were tested, limiting examination of the proximal relations of these constructs (Batterham et al., 2018; Czyn, Berona, & King, 2015; Miller, Esposito-Smythers, & Leichtweis, 2016). Testing the IPTS within shorter time frames is critical given that the theory specifies *proximal* causes of suicidal ideation and

attempts (Van Orden et al., 2010). Moreover, research revealed that suicidal ideation fluctuates within and across days (Czyz, Horwitz, Arango, & King, 2019; Hallensleben et al., 2019; Kleiman et al., 2017), suggesting the need for more nuanced, within-person investigation of its causes.

The few studies investigating proximal associations of IPTS constructs with suicidal ideation and behavior were inconclusive. Among adult psychiatric inpatients and adults with past-year suicide attempts, thwarted belongingness, perceived burdensomeness, and hopelessness predicted suicidal ideation occurring 4–6 hr later, but not when controlling for initial levels of suicidal ideation (Kleiman et al., 2017). In an inpatient sample of adults with depression, perceived burdensomeness and thwarted belongingness were concurrently associated with passive suicidal ideation, but only hopelessness and burdensomeness predicted passive ideation 30 min to a few hours later (Hallensleben et al., 2019). Regarding active suicidal ideation, one study found that perceived burdensomeness, thwarted belongingness, and hopelessness were concurrent correlates, while the interaction between thwarted belongingness and perceived burdensomeness was a prospective predictor (Hallensleben et al., 2019). Among adolescents recently discharged for a suicide attempt or suicidal ideation, hopelessness, perceived burdensomeness, and thwarted belongingness predicted same-day, but not next-day, suicidal ideation, and belongingness reduced the effects of high burdensomeness or hopelessness on same-day suicidal ideation (Czyz et al., 2019). Finally, among individuals at risk for suicide, only perceived burdensomeness predicted suicidal ideation 3 days later (Rogers & Joiner, 2019). These studies critically evaluated short-term correlates of suicidal ideation within and across days, offering some evidence for the proximal role of each theorized variable. However, few studies separated passive and active suicidal ideation, and none tested the IPTS's distinct predictions regarding the interaction among thwarted belongingness, perceived burdensomeness, and hopelessness in predicting active suicidal ideation. Furthermore, none tested the theory's position on active suicidal ideation transitioning into a suicide attempt.

PURPOSE AND HYPOTHESES

In sum, the specific tenets of the IPTS, including the proximal nature of its hypotheses, have not received sufficient scrutiny (Hjelmeland & Loa Knizek, 2018). The present study aimed to address this issue by testing the IPTS at the proximal level by examining the concurrent, daily associations of the IPTS constructs using repeated measurements over 90 days. First, we hypothesized that thwarted belongingness and perceived burdensomeness would be independently, positively associated with same-day passive suicidal ideation. Second, we hypothesized that a three-way interaction among thwarted belongingness, perceived burdensomeness, and hopelessness would be positively associated with same-day active suicidal ideation, such that perceived burdensomeness would be positively associated with active suicidal ideation only at high levels of hopelessness and thwarted belongingness. Third, we hypothesized that active suicidal ideation would be positively associated with same-day suicidal behaviors, but only at high levels of capability for suicide. The study focused on suicidal behaviors, defined as aborted, prevented, interrupted, or actual attempts, given the low base rate of actual suicide attempts (Brent et al., 2009; Burns, Angold, Magruder-Habib, Costello, & Patrick, 1997; Posner et al., 2011; Posner, Oquendo, Gould,

Stanley, & Davies, 2007). Furthermore, given that the IPTS proposes that active suicidal ideation paired with fearlessness about death is required for intent to attempt suicide, we also tested whether active suicidal ideation predicted same-day suicidal behavior in the presence of fearlessness about death.

METHODS

Participants

A total of 1,338 undergraduate students from the psychology subject pool of a large southeastern university participated in the screener survey. Four-hundred and forty (33%) students met participation criteria and completed the baseline phase. At least three daily data points per participant were needed for the analyses, which resulted in a sample of 206 participants. Average age for this subset of the sample was 19.05 years old ($SD = 2.39$; range: 18–46). Most participants were women (73%) and White/Caucasian (82.4%). Eight percent identified as Hispanic or Latino(a). Most participants identified as heterosexual (85%) and single, not living with a partner (89.5%). Most participants reported residing with someone else, including friends/roommates (65%), and family (15%). The majority of participants were freshman (69.3%). Yearly household income distribution was as follows: < \$50,000 (38.8%), \$50,000–\$100,000 (27.7%), \$100,000–\$150,000 (16%), \$150,000–\$200,000 (6.4%), >\$200,000 (11.2%).

Procedures

Participants were recruited via Introduction to Psychology courses at the university. Interested students completed a brief, anonymous, eligibility questionnaire using the following inclusion criteria: (1) 18 years of age or older, (2) consumed alcohol within the past month, and (3) ever thought about or attempted suicide. Alcohol use was an inclusion criterion for a larger study aim of which results are not reported here. Eligible individuals who provided informed consent completed an anonymous, baseline survey on [Qualtrics.com](https://www.qualtrics.com). Participants entered their e-mail address in a separate survey (which was kept confidential) for the second study phase.

Data collection was anonymous to reduce concerns about reactivity to assessment that may impact the scientific integrity of the study. As others have suggested, anonymity in suicide research may reduce shame or anxiety about revealing suicidal thoughts (Gibson, Benson, & Brand, 2013), thus improving participant comfort and study validity. Due to the anonymity of the data collection, we were not in a position to intervene with participants. However, because of their participation, participants were given daily access to our study resources page that included suicide hotlines and local referral. Furthermore, when individuals endorsed any level of suicidal ideation or behavior, they were directed to a page that conveyed concern for their well-being and encouraged them to contact the researcher or the various resources provided.

Given that the data were anonymous, participants' baseline and daily survey data were linked using subject-generated identification codes. Participants created a seven-letter unique

identifier that was used to link their baseline and daily surveys (Yurek, Vasey, & Havens, 2008).

Daily surveys began the day after the baseline survey. Participants were e-mailed the 5-min daily surveys each day at 6 a.m., with a reminder e-mail at 12 p.m., for 90 days. Each survey required participants to recall their previous day's behavior, defined as the time they awoke until the time they went to sleep. Participants were compensated 75 cents to one dollar per survey, depending on the time they enrolled in the study. Five months into the study, compensation was increased to one dollar per survey to improve compliance rates for both actively enrolled and newly recruited participants. Participants who completed at least 75% of their surveys were paid an additional \$10, totaling to a maximum from \$77.50 to \$100 in compensation for study participation.

Measures

Baseline Measures.—Baseline measures collected demographic information and history of suicidal ideation, suicidal behaviors, and current thwarted belongingness, perceived burdensomeness, and capability for suicide. These were collected to compare individuals who completed the daily survey portion of the study with those who did not or did not complete enough surveys to be included in the analyses.

Demographics. Variables included but were not limited to age, gender identity, racial/ethnic identity, sexual orientation, relationship status, family income, and year in school.

Thwarted Belongingness and Perceived Burdensomeness. The interpersonal Needs Questionnaire (INQ; Van Orden, Cukrowicz, Witte, & Joiner, 2012) is a 15-item measure that assessed thwarted belongingness (nine items) and perceived burdensomeness (six items). The items are on a 7-point Likert scale, ranging from “1 = not at all true for me” to “7 = very true for me.” The total score for each subscale was the sum of the items, with possible scores ranging from 9 to 63 for thwarted belongingness and 6 to 42 for perceived burdensomeness. The INQ demonstrated convergent validity (Van Orden et al., 2012) and excellent internal consistency in a past sample of college students (Wolford-Clevenger, Elmquist, Brem, Zapor & Stuart, 2016) and in the current study (perceived burdensomeness: $\alpha = .94$, thwarted belongingness: $\alpha = .91$).

Hopelessness. Hopelessness was measured using a brief measure of hopelessness, the Brief-H-Neg (Fraser et al., 2014). The measure includes two items assessing hopelessness on a 5-point scale (1 = “absolutely disagree” to 5 = “absolutely agree”). The total score was the sum of the items, with possible scores ranging from 2 to 10. The measure demonstrated excellent convergent validity with the Beck Hopelessness Scale and good internal consistency in a sample of postmenopausal women (Fraser et al., 2014). The measure had good internal consistency in a prior sample of college students ($\alpha = .79$; Nam, Hilimire, Jahn, Lehmann, & DeVlyder, 2018) and in the current sample ($\alpha = .81$).

Capability for Suicide. The 20-item Acquired Capability for Suicide Scale (ACSS, Van Orden et al., 2008) assessed pain tolerance and fearlessness about death on a 5-point Likert scale: 1 (“not at all like me”) to 5 (“very much like me”). The total score was the sum of the

items, with total possible scores ranging from 20 to 100. The reliability and validity of the total score of this measure were supported in previous research (Van Orden et al., 2008), and its internal consistency was good in the present sample ($\alpha = .84$).

Suicidal Ideation. The 4-item Hopelessness Depression Symptom Questionnaire-Suicidality Subscale (HDSQ-SS; Metalsky & Joiner, 1997) assessed the frequency, planning, controllability, and impulsive nature of suicidal ideation over the past week. The total score was the sum of the items with total possible scores ranging from 0 to 12. The scale demonstrated excellent internal consistency and construct validity in college students (Metalsky & Joiner, 1997) and in the present sample ($\alpha = .91$).

Suicidal Behavior. Participants selected whether they have never attempted suicide, attempted suicide once, or attempted suicide more than once. To assess history of aborted, prevented, or interrupted suicide attempts, four items similar to those in the Columbia-Suicide Severity Rating Scale and Child and Adolescent Services Assessment were used (C-SSR; CASA; Brent et al., 2009; Burns, Angold, Magruder-Habib, Costello, & Patrick, 1997; Posner et al., 2011; Posner et al., 2007). These items were face valid (e.g., “How many times have you ever started to do something to end your life but someone or something stopped you before you actually did anything?”) and were on a 7-point Likert scale ranging from zero (0) to more than twenty (6) times. A dichotomized version of the suicide attempt item (0 = never, 1 = at least once) and the four aborted, prevented, or interrupted attempt items were summed to create a suicidal behavior variable, with a possible total score ranging from 0 to 25. The scale had marginal internal consistency ($\alpha = .69$).

Daily Measures.—Daily measures collected information on daily suicidal ideation, suicidal behaviors, hopelessness, thwarted belongingness, perceived burdensomeness, and capability for suicide.

Thwarted Belongingness and Perceived Burdensomeness. Participants rated their overall daily perceived burdensomeness and thwarted belongingness using four INQ items that most highly correlated with the subscales in the validation study (Van Orden et al., 2012). Participants were instructed to “Rate how you felt OVERALL yesterday.” The perceived burdensomeness items were as follows: “I felt that the people in my life would have been happier without me,” and “I felt that the people in my life would have been better off if I were gone.” The thwarted belongingness items were as follows: “I felt close to others,” and “I felt like I belonged.” Items were on a 7-point Likert scale (1 = “not at all true for me” to 7 = “very true for me”). The items were summed, with total possible scores for each variable ranging from 2 to 14.

Capability for Suicide. Participants were asked to rate their overall daily fearlessness about death and perceived pain tolerance. They were instructed to answer the item based on their overall feelings the day before. We used the two items from the ACSS with highest factor loadings on the pain tolerance and fearlessness about death scales in an ACSS validation study: “I could tolerate a lot more pain than most people,” and “I was not at all afraid to die” (Smith, Wolford-Clevenger, Mandracchia, & Jahn, 2013). Items were rated on a 5-point

Likert scale (1 = “not at all like me” to 5 = “very much like me”). The items were summed, with total possible scores for the capability for suicide variable ranging from 2 to 10.

Suicidal Ideation and Behaviors. Participants completed the five-item Paykel Suicide Scale (PSS; Paykel, Myers, Lindenthal, & Tanner, 1974) regarding suicidal ideation and attempts during the previous day (yes = 1, no = 0). Items 1 (i.e., “life not worth living”) and 2 (i.e., “wish to be dead”) were summed to create a passive suicidal ideation variable, and items 3 (i.e., “think of taking life”) and 4 (i.e., “seriously consider taking life/plans”) were summed to create an active suicidal ideation variable. Total possible scores for each variable ranged from 0 to 2. The PSS item 5 assessed whether or not (yes = 1, no = 0) a suicide attempt occurred. If a suicide attempt did not occur, participants were asked about aborted/interrupted attempts via the same four items used at baseline, with the scale changed to yes = 1 and no = 0. These items were summed with the suicide attempt item to create a suicidal behaviors variable, with total possible scores ranging from 0 to 4 (given that suicide attempt endorsement precluded assessment of interrupted/aborted attempts).

Hopelessness. We assessed daily hopelessness using the “hopeless” item from the depression-dejection subscale of the Profile of Mood States, Short Form (POMS-SF; Shacham, 1983). Participants were instructed the following: “Below is a list of words that describes feelings people have. Please read each one carefully. Select [what] best describes how you were feeling yesterday.” This item was on a 5-point Likert scale (0 = “not at all” to 4 = “extremely”), with total possible score ranging from 0 to 4. The POMS was used in other daily diary studies and was psychometrically sound (cranford et al., 2006; Curran, Andrykowski, & Studts, 1995).

Data Analytic Strategy

Before testing hypotheses, differences in demographics and the primary study variables were explored between participants who did not take part in the daily survey portion of the study or who did not complete at least 3 days of daily surveys (i.e., noncompliant) with those in the final sample (i.e., compliant). Second, compliance rates for the daily data were computed by calculating the percentage of missed surveys in relation to total surveys sent.

The statistical program, Hierarchical Linear Modeling (HLM) version 7 (Scientific Software international, Skokie, Illinois), was used to examine study hypotheses. Because repeated measures of daily data were nested within individuals and we were interested in the average effects of the predictors on the outcomes, multilevel modeling using fixed slopes and full maximum likelihood estimation was used to test hypotheses. For all analyses testing interactions, *Z*-scores were computed for first-order predictors and then these standardized variables were used to create the interactions. Given the use of *Z*-scores, no centering was used within HLM. For each hypothesis test, time (day) was included as a Level-1 covariate, grand-mean centered. The first hypothesis, the main effects of daily thwarted belongingness and perceived burdensomeness on passive suicidal ideation, was examined by comparing π_1 and π_2 to 0 using the following Level-1 equation: Daily passive suicidal ideation = $\pi_0 + \pi_1$ (daily thwarted belongingness) + π_2 (daily perceived burdensomeness) π_3 (day) + e.

Regarding the second hypothesis, the interactive effect of daily thwarted belongingness, perceived burdensomeness, and hopelessness on daily active suicidal ideation, we first tested the null model for active suicidal ideation. Second, the three-way interaction was tested by comparing π_7 to 0 using the Level-1 equation— daily active suicidal ideation = $\pi_0 + \pi_1$ (daily thwarted belongingness) + π_2 (daily perceived burdensomeness) + π_3 (daily hopelessness) + π_4 (thwarted belongingness \times perceived burdensomeness) + π_5 (thwarted belongingness \times hopelessness) + π_6 (perceived burdensomeness \times hopelessness) + π_7 (thwarted belongingness \times perceived burdensomeness \times hopelessness) + π_8 (day) + e. If the interaction was significant, the effect of perceived burdensomeness on active suicidal ideation was probed at high and low levels of hopelessness and thwarted belongingness.

The third hypothesis, the interactive effect of daily capability for suicide and active suicidal ideation on suicidal behaviors, was tested by first estimating the null model for suicidal behaviors. Second, we tested the two-way interaction by comparing π_3 to 0 using the following Level-1 equation: Daily suicidal behavior = $\pi_0 + \pi_1$ (daily capability for suicide) + π_2 (daily active suicidal ideation) + π_3 (daily capability for suicide \times suicidal ideation) + π_4 (day) + e. We ran the aforementioned analysis again using replacing the capability for suicide variable with the fearlessness about death item. Finally, given that capability for suicide may be partly inherited (Smith et al., 2012; Smith & Cukrowicz, 2010) and best understood as a between-person variable, we also tested the cross-level interaction between Level-2 (baseline) capability for suicide and Level-1 (daily) active suicidal ideation. That is, we examined whether the relation of daily active suicidal ideation with daily suicidal behavior was dependent on high levels of baseline capability for suicide.

RESULTS

Descriptives

Differences Between Noncompliant and Compliant Participants.—Compliant participants reported greater suicidal behavior at baseline ($M = 1.76$; $SD = 2.12$) than non-compliant participants ($M = 1.33$; $SD = 2.34$); $t(440) = 1.98$, $p = .048$. A greater percentage of women (53%) than men (31%) completed the daily portion of the study; $\chi^2(1) = 20.03$, $p < .001$. A greater percentage of compliant participants (28%) experienced suicidal ideation at baseline than noncompliant participants (19%); $\chi^2(1) = 6.86$, $p = .006$.

Baseline Descriptives.—Twenty-eight percent ($n = 56$) of the sample reported experiencing past week suicidal ideation, and 25% ($n = 50$) reported ever attempting suicide. Gender differences were explored in the primary study variables. Men reported greater capability for suicide ($M = 68.60$; $SD = 13.37$) than women ($M = 62.20$, $SD = 12.14$); $t(200) = 3.21$, $p = .002$. See Table 1 for bivariate correlations and descriptives of baseline variables.

Daily Data Compliance Rates.—Participants completed a total of 7,342 (39.6%) of the 18,540 surveys sent. The compliance rates were the following: 30 days (57.7%), 60 days (33.8%), and 90 days (26.9%). Out of the 90 daily surveys sent out, 50 participants (24.27%) completed between 30 and 60 days, and 51 participants (24.8%) completed 61 or more days. Thus, we had at least 1 month of data from 49% of the sample.

Daily Data Descriptives and Basic Associations.—Of the daily surveys completed, some level of suicidal ideation occurred on 692 (9.5%) of the completed days. Sixty-two percent ($n = 127$) of the sample reported suicidal ideation on at least 1 day. Given the extremely low percentage of suicide attempts reported (4 days), suicide attempts were combined with aborted/interrupted attempts to form a suicidal behavior variable (0.4%; 31 days). Eight percent ($n = 16$) of the sample reported suicidal behavior on at least 1 day.

The means and standard deviations of the primary daily study variables were as follows: suicidal ideation ($M = 0.20$, $SD = 0.69$), suicidal behavior ($M = 0.01$, $SD = 0.09$), hopelessness ($M = 0.47$, $SD = 0.93$), thwarted belongingness ($M = 6.06$, $SD = 3.50$), perceived burdensomeness ($M = 3.35$, $SD = 2.34$), and capability for suicide ($M = 5.52$, $SD = 2.66$). Gender differences were explored in the primary daily study variables. Women reported greater perceived burdensomeness ($M = 3.42$, $SD = 2.34$) than men ($M = 3.03$, $SD = 2.20$; $t(7,006) = -6.46$, $p < .001$). Men reported greater thwarted belongingness ($M = 6.51$, $SD = 3.54$) than women ($M = 5.79$, $SD = 3.43$); $t(7,009) = 7.84$, $p < .001$). Men were more likely to have suicidal ideation days (11.12%) than women (8.76%); $\chi^2(1) = 9.15$, $p = .002$.

Hypothesis Tests

Passive suicidal ideation, active suicidal ideation, and suicidal behavior were log-transformed for the following analyses given positive skew and kurtosis. Given the gender differences reported above, we tested the following cross-level interactions: Level-2 gender \times Level-1 thwarted belongingness and Level-1 perceived burdensomeness predicting passive suicidal ideation, Level-2 gender \times Level-1 thwarted belongingness and Level-1 perceived burdensomeness predicting active suicidal ideation, and Level-2 gender \times Level-1 capability for suicide (overall and fearlessness about death) predicting suicidal behavior. None of these cross-level interactions were significant ($p > .10$); therefore, these cross-level interactions were removed from our models.

The intraclass correlation coefficient for the null model predicting passive suicidal ideation was 0.60 (i.e., 60% of the variance in passive suicidal ideation was due to variance between individuals). This indicated that 40% of the variation was due to differences within individuals and that multilevel modeling was appropriate to use for testing the remaining analyses. The model testing the main effects of daily thwarted belongingness and perceived burdensomeness revealed that thwarted belongingness and perceived burdensomeness were positively associated with passive suicidal ideation (see Table 2).

Regarding the second hypothesis, the intraclass correlation coefficient for the null model predicting active suicidal ideation was 0.49 (i.e., 49% of the variance in passive suicidal ideation was due to variance between individuals). This indicated that 51% of the variation was due to differences within individuals. The three-way interaction among perceived burdensomeness, thwarted belongingness, and hopelessness in predicting active suicidal ideation trended toward significance (see Table 3). Given the strong theoretical rationale for this three-way interaction, we proceeded to explicate it as planned in the data analytic strategy. Perceived burdensomeness was positively associated with active suicidal ideation only when both thwarted belongingness and hopelessness were high ($B = .02$, $t = 5.04$, $p < .$

001). Perceived burdensomeness was not associated with active suicidal ideation when both thwarted belongingness and hopelessness were low ($p = .88$), when thwarted belongingness was high and hopelessness was low ($p = .99$), or when thwarted belongingness was low and hopelessness was high ($p = .50$).¹

Regarding the third hypothesis, the intraclass correlation coefficient for the null model predicting suicidal behavior was 0.19 (i.e., 19% of the variance in passive suicidal ideation was due to variance between individuals). This indicated that 81% of the variation was due to differences within individuals. The two-way interaction between active suicidal ideation and capability for suicide was not significant ($p = .81$); therefore, the model with the main effects was reported. Active suicidal ideation, but not capability for suicide, was positively associated with suicidal behavior (see Table 4). The model using the fearlessness about death also revealed a nonsignificant association between the two-way interaction and suicidal behavior ($p = .94$). Therefore, the main-effects model was reported (see Table 4). Active suicidal ideation, but not fearlessness about death, was positively associated with suicidal behavior. We calculated intraclass correlation coefficients to further explore the potential effect of capability for suicide on suicidal behaviors, which revealed that 83% and 85% of the variance in daily capability for suicide and fearlessness about death were due to between-person differences, respectively. A test of the cross-level interaction between Level-2 capability for suicide and Level-1 active suicidal ideation in predicting suicidal behavior was not supported ($p = .70$).

DISCUSSION

The current study is an important contribution to the movement in the field of suicidology to improve prediction of suicide risk in the short term (Glenn & Nock, 2014). Our findings revealed that 40%–81% of the variability in suicidal ideation and behaviors was within-person variation, highlighting the importance of focusing on explanations of intra-individual, rather than interindividual, differences (Curran & Bauer, 2011). Further-more, the current study is one of few studies designed to test the proximal predictions of IPTS. The IPTS hypotheses regarding passive and active suicidal ideation were fully supported. Thwarted belongingness and perceived burdensomeness were both positively associated with passive suicidal ideation within the same day. The theorized three-way interaction among perceived burdensomeness, thwarted belongingness, and hopelessness neared statistical significance in predicting active suicidal ideation, such that perceived burdensomeness was positively associated with active suicidal ideation only at high levels of thwarted belongingness and hopelessness at the daily level. However, the IPTS hypotheses regarding suicidal intent and behaviors were not supported. Active suicidal ideation was positively associated with suicidal behavior within a day, regardless of levels of fearlessness about death or overall capability for suicide.

¹When the three-way interaction term was removed from the overall model, only the two-way interaction between perceived burdensomeness and hopelessness was significant ($B = .01$, $t = 3.72$, $p < .001$). Explication of this interaction indicated that perceived burdensomeness was associated with active suicidal ideation at high ($B = .02$, $t = 6.29$, $p < .001$), but not low ($B = -.001$, $t = -0.06$, $p = .52$), levels of hopelessness.

Our results regarding passive suicidal ideation replicate prior findings that unmet interpersonal needs were a proximal correlate of suicidal ideation (Czyz et al., 2019; Kleiman et al., 2017; Rogers & Joiner, 2019). Regarding proximal causes of active suicidal ideation, the present study is of the first to support the three-way interaction among thwarted belongingness, perceived burdensomeness, and hopelessness. This finding is a meaningful extension to prior work finding that various two-way interactions among these variables proximally relate to active suicidal ideation or suicidal ideation in general (Czyz et al., 2019; Hallensleben et al., 2019). The present study had a large number of observations compared to prior work (Czyz et al., 2019; Hallensleben et al., 2019), allowing for a more powerful test of the three-way interaction. However, these prior studies also differed from the present study in timing of the measurements (e.g., everyday vs. every few hours), as well as the items used for the IPTS constructs and suicidal ideation. Support of the three-way interaction also replicated prior cross-sectional work (Hagan et al., 2015; Tucker et al., 2018). Note, however, that the present study did not assess hopelessness *about* unmet interpersonal needs, which was achieved by only one study (Tucker et al., 2018). Developing the first measure of such interpersonal hopelessness, Tucker et al. (2018) showed that this construct correlated with general hopelessness very strongly, suggesting that the present findings are likely to be replicated using an interpersonal hopelessness measure. Future daily diary or ecological momentary assessment studies could include select items from the Interpersonal Hopelessness Scale (Tucker et al., 2018). Alternatively, participants' ratings of disconnection and burdensomeness could be weighted by rankings of how likely they believe these interpersonal states will persist. The interpersonal hopelessness component remains an unexplored area of the theory in need of additional investigation.

Given the inherent difficulty in studying the low-base-rate behavior of suicide attempts, this study is one of the first to test the IPTS regarding its predictions of suicidal behavior. Active suicidal ideation was associated with suicidal behavior, regardless of levels of fearlessness about death or overall capability for suicide. However, this finding is preliminary, as there were very few observations of suicidal behaviors ($n = 31$). Although ethically and scientifically challenging, future ecological momentary assessment studies are needed to identify proximal predictors of suicidal behaviors—especially suicide attempts (Davidson, Anestis, & Gutierrez, 2017). These data would also permit examination of within-person variation, ultimately allowing us to test whether suicide theories can adequately account for such nuance in risk (Hjelmeland & Loa Knizek, 2018). Alternatively, the Timeline Follow-Back Interview (e.g., Bagge, Glenn, & Lee, 2013) could circumvent the challenge of infrequent suicidal behaviors in prospective designs by retrospectively assessing interpersonal needs, related hopelessness, and severity of suicidal ideation immediately prior to a suicide attempt. In addition to replication efforts, the null findings regarding capability for suicide suggest the need to consider other conceptualizations of this construct. Other theorists expanded the conceptualization of capability for suicide, including practical (e.g., knowledge, methods, and means) and dispositional (e.g., trait fearlessness) capability (Klonsky & May, 2015). These components should be assessed in future work to determine which are necessary to cause active suicidal ideation to transition to a suicide attempt. Additionally, although capability for suicide has been conceptualized as both inherited and acquired (Klonsky & May, 2015; Smith et al., 2012; Smith & Cukrowicz, 2010; Van Orden

et al., 2010), the question of whether individuals vary in their capability for suicide over time has not been tested. Indeed, the present data suggest that capability varied more between than within individuals. Future tests of the proximal relations of the IPTS constructs will need to determine whether capability for suicide should be considered a within- or between-person variable.

Clinical Implications

The present findings have preliminary clinical implications. First, the proximal associations of unmet interpersonal needs and hopelessness with active suicidal ideation support prior recommendations that these experiences warrant further assessment to manage suicidal risk. These findings also suggest that among college students experiencing suicidal ideation, treatments that increase feelings of connectedness, hope, and contribution may decrease risk for suicidal thoughts. Given that the IPTS focuses on *perceptions* of connectedness and burdensomeness, cognitive behavior therapy attending to relevant cognitive distortions may be useful (Rudd, Joiner, & Rajab, 2001). Finally, on a broader scale, universities and colleges can seek to reduce risk for suicidal ideation by creating campus initiatives that increase hope, belongingness, and self-worth. There are no known current prevention programs designed to address these feelings among college students; thus, development and empirical tests of such a program are potentially useful. Describing a problem-focused paradigm that addresses the full range of suicidal thoughts and behaviors among college students, Drum et al. (2009) suggested many examples of prevention and intervention efforts that could increase perceptions of self-worth, belonging, and hope. For example, living-learning environments, freshman interest groups, healthy self-care activities, and early use of mental health screenings may prevent the onset of suicidal ideation among some college students. For individuals experiencing suicidal thoughts who are at nonimminent risk, mental health workshops, groups, and interventions involving close loved ones may be appropriate for addressing interpersonal needs and hope (Drum et al., 2009).

Limitations

Although the present study improved upon a major limitation in the literature—limited tests of proximal associations of IPTS constructs—study weaknesses remain. First, participants from the present sample were selected based on a prior history of suicidal thoughts or behavior as well as drinking alcohol (for the purposes of a larger study). This limitation reduces the generalizability of the findings. Second, low compliance rates may have affected the findings. For example, individuals who engaged in serious suicidal ideation or behavior the day prior may have been prone to skipping the following daily survey (e.g., due to desire not to revisit previous day events). More frequent prompting, or prompting via a phone call, might have increased compliance; however, this method has the limitation of reminding the participant that they are being observed (i.e., Hawthorne effect), which has its own potentially negative effect on study validity. Relatedly, distribution of the surveys via text message, rather than e-mail, may have improved compliance rates. Third, given that participants reported on previous day behavior, there may be recall bias, which could be improved through event-based or random sampling within a day. Finally, we did not measure whether hopelessness, thwarted belongingness, or perceived burdensomeness occurred prior to suicidal ideation and behavior. The relations among these variables are likely complex,

with reciprocal influences on each other (Rogers & Joiner, 2019). Future studies are needed to address this issue.

CONCLUSIONS

The present findings add to the few studies testing the proximal tenets of the interpersonal-psychological theory of suicide, supporting the theory's predictions regarding passive and active suicidal ideation but not suicidal behaviors. If the IPTS is to guide our understanding and treatment of suicidal thoughts and behaviors, replication of these findings with different time-based measurements and clinical samples is needed.

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TABLE 1

Bivariate Correlations and Descriptive Statistics for Baseline Study Measures

	1	2	3	4	5	6
1. Hopelessness	—	—	—	—	—	—
2. Thwarted Belongingness	.57**	—	—	—	—	—
3. Perceived Burdensomeness	.61**	.65**	—	—	—	—
4. Capability for Suicide	.14*	.22**	.28**	—	—	—
5. Suicidal Ideation	.50**	.46**	.59**	.28**	—	—
6. Suicidal Behavior	.32**	.26**	.45**	.23**	.38**	—
Mean (<i>SD</i>)	2.98 (2.46)	29.14 (12.34)	12.85 (7.66)	64.02 (12.87)	0.94 (1.81)	1.73 (2.12)

SD = standard deviation.

* $p < .05$;

** $p < .01$ (two-tailed).

TABLE 2

Parameters for Model Predicting Passive Suicidal Ideation

Level-1 Variables	B	SE	t	df	p
Intercept	.03	.004	7.03	202	<.001
Day	-.00005	.00005	-1.02	202	0.31
Thwarted Belongingness	.03	.004	6.91	202	<.001
Perceived Burdensomeness	.04	.005	7.69	202	<.001

TABLE 3

Parameters for Model Predicting Active Suicidal Ideation

Level-1 Variables	B	SE	t	df	p
Intercept	.05	.01	5.92	202	<.001
Day	-.0001	.00004	-2.80	202	.01
Thwarted Belongingness (TB)	.003	.002	1.95	202	.05
Perceived Burdensomeness (PB)	.005	.002	2.57	202	.01
Hopelessness	.02	.003	5.29	202	<.001
TB × PB	.003	.001	2.04	202	.04
TB × Hopelessness	.002	.002	0.92	202	.36
PB × Hopelessness	.01	.003	1.60	202	.11
TB × PB × Hopelessness	.003	.002	1.77	202	.078

TABLE 4

Parameters for Model Predicting Suicidal Behavior

Level-1 Variables	B	SE	t	df	p
Model using Fearlessness about Death item					
Intercept	.001	.0004	2.25	202	.03
Day	<.00001	.00001	0.07	202	.94
Active Suicidal Ideation	.004	.002	2.33	202	.02
Fearlessness About Death	.0001	.0002	0.46	202	.64
Model using Capability for Suicide Variable					
Intercept	.004	.002	2.53	202	.01
Day	<.00001	.00001	-0.02	202	.99
Active Suicidal Ideation	.004	.002	2.36	202	.02
Capability for Suicide	.0001	.0002	0.30	202	.76