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A Case Controlled Examination of the Interpersonal Theory of Suicide in the Second Half of Life

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Abstract

The interpersonal theory of suicide proposes that the most proximal cause of suicide is the combination of thwarted belongingness and perceived burdensomeness coupled with a pre-existing vulnerability of reduced fear of death and increased pain tolerance. This pre-existing vulnerability develops in response to painful and provocative life events. According to the theory, empirically demonstrated risk factors for suicide operate by increasing the likelihood of one or more of the theory's constructs.

Objectives—The current study examined the relations of the major constructs of the interpersonal theory with suicide case status compared to living controls in the second half of life.

Methods—The current study used a pre-existing psychological autopsy database to compare suicide decedents to living controls 50 years and older. Theory constructs were measured by composite scores of thwarted belongingness, perceived burdensomeness, and painful and provocative experiences using an *a priori* selection of items comprising each construct.

Results—Suicide decedents experienced greater levels of all three of the theory's constructs when examined independently compared to living controls. When examined simultaneously while also controlling for Major Depression, greater perceived burdensomeness and painful and provocative experiences were associated with suicide case status (vs. control).

Conclusions—The interpersonal theory is a comprehensive framework that may be useful in understanding risk for death by suicide in the second half of life. Clinical management of suicide risk for adults in the second half of life could include a focus on perceived burdensomeness, as the IPTS proposes that this psychological state is amenable to change via therapeutic intervention.

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Keywords

Suicide; Psychological Autopsy; Interpersonal Theory of Suicide

Suicide in later life is a significant public health problem. Older adults have higher rates of suicide than younger individuals in most countries worldwide (Heron et al., 2009; World Health Organization, 2003) and the size of the older adult population will soon rise dramatically in the U.S. (Kinsella, Wan, & U.S. Census Bureau, 2009; United Nations, 2009). As such, we can anticipate a large rise in the number of older adults who die by suicide in coming decades (Conwell, Dubertstein, & Caine, 2002). Current approaches to late-life suicide prevention are limited. Several psychotherapies, including cognitive behavioral therapy (CBT) and interpersonal psychotherapy (IPT) have been adapted for older adults at risk for suicide (Bhar & Brown, 2012; Heisel, Talbot, King, Tu, & Duberstein, 2014). However, interventions for which the study outcome was suicide deaths, such as the TeleHelp-Tele-Check intervention (De Leo, Dello Buono, & Dwyer, 2002), have been largely effective only for women (Lapierre et al., 2011), while in most countries older men are at substantially higher risk. Psychological science could potentially contribute to suicide prevention efforts by elucidating the psychological processes that may be operative among depressed older adults that render them at greater risk for death by suicide.

One potential framework for examining such processes is the interpersonal theory of suicide (IPTS) (Joiner, 2005; Van Orden et al., 2010). This theory proposes that the proximal cause of the most severe and pernicious form of suicidal desire (or ideation) is the combined experience of two psychological states—thwarted belongingness and perceived burdensomeness. Thwarted belongingness is a painful psychological state in which one's need to belong to valued, positive relationships or groups is not met. Perceived burdensomeness is a similarly painful psychological state in which one perceives his or her impact on the lives of others to be negative, to the point of burdening others. Suicidal desire, however, can only translate into a lethal or near-lethal suicide attempt in the presence of an acquired capability for suicide. The capability for suicide is acquired via habituation to fear and physical pain and is facilitated by engaging in what the theory terms, painful and provocative (i.e., frightening) events (e.g., prior suicide attempts, non-suicidal self-injury, accidental injury, aggressive behavior)(Smith & Cukrowicz, 2010). A more exhaustive description of the IPTS including fundamental assumptions and core hypotheses can be found in Van Orden et al., (2010).

The IPTS holds that risk factors for suicide elevate risk for suicide by increasing thwarted belongingness, perceived burdensomeness, and painful and provocative experiences. For example, the theory includes the hypothesis that depression is a major cause of suicide, but that in the final proximal chain of events leading up to a suicide death, depression is a more distal factor that operates by increasing the likelihood that an individual will experience thwarted belongingness and/or perceived burdensomeness (see Figure 1 for this conceptual model).

The IPTS was developed to explain suicide across the lifespan. Existing empirical data suggest that the theory is applicable to, and may even be particularly relevant to, suicide in

later life (Van Orden & Conwell, 2011). Van Orden and Conwell (2011) describe, for example, how findings from psychological autopsy studies have identified key risk factors for late-life suicide—depression, functional impairment, pain, physical illness, and social isolation—that represent key risk factors for the theory's constructs. Functional impairment and physical illness are posited by the theory to elevate risk for perceptions of burdensomeness. Depression and social isolation are proposed to elevate risk for thwarted belongingness. Whereas the theory proposes that previous suicide attempts and other suicidal behaviors (e.g., aborted suicide attempts, preparatory behaviors, and even suicide ideation with plans or preparations) represent the most direct route toward the acquired capability, older adults typically die by suicide on their first attempt. As such, we have proposed elsewhere that behaviors and experiences less analogous to suicide that are common in later life, such as advanced physical illness (which may make death more salient) and chronic physical pain, influence acquired capability indirectly by facilitating habituation to the fear of—and pain involved in—death. Thus, given the close concordance between risk factors for late-life suicide and the theory's constructs, the IPTS may be especially relevant to the etiology and prevention of suicide in later life.

Empirical data derived from direct tests of the theory are largely supportive of hypotheses related to belongingness and burdensomeness as contributors to suicidal desire and ideation (Christensen, Batterham, Soubelet, & Mackinnon, 2012; Cukrowicz, Cheavens, Van Orden, Ragain, & Cook, 2011; Freedenthal, Lamis, Osman, Kahlo, & Gutierrez, 2011; Garza & Pettit, 2011; Joiner et al., 2002; Joiner et al., 2009; Van Orden, Lynam, Hollar, & Joiner, 2006) and acquired capability as an indicator of greater risk for suicide behavior but not ideation (Bryan, Cukrowicz, West, & Morrow, 2010; Franklin, Hessel, & Prinstein, 2011; Selby et al., 2010; Smith, Cukrowicz, Poindexter, Hobson, & Cohen, 2010; Van Orden, Witte, Gordon, Bender, & Joiner, 2008; Witte, Didie, Menard, & Phillips, 2012). Despite the accumulating evidence supporting the IPTS, many of the theory's hypotheses remain untested. Most critical among these is the limited number of studies that examine death by suicide as the outcome. Rather, the vast majority of studies on the IPTS examine suicide ideation and non-fatal attempts as outcomes. Although this is not surprising given that suicide is a rare event, one of the most novel aspects of the theory is addresses why so few people who think about and attempt suicide actually die by suicide. As such, studies examining the outcome of lethal suicidal behavior are essential to the emerging body of research on the IPTS.

We are aware of two studies that directly test the IPTS's hypotheses with the outcome of suicide deaths. In the first study Joiner and colleagues (Joiner et al., 2002) compared suicide notes from individuals who attempted suicide and survived to those who died by suicide. The notes were compared regarding the presence of perceived burdensomeness, hopelessness, and emotional pain. Only burdensomeness was found to be associated with suicide deaths. The other dimensions did not distinguish between those who survived versus those who died. Further, perceived burdensomeness was associated with the use of more lethal means. Thwarted belongingness and acquired capability were not examined.

Another study used psychological autopsy methods (i.e., utilizing retrospective reports from those who knew the deceased) to test the IPTS among Air Force personnel. Nademin and

colleagues (2008) selected items from a pre-existing psychological autopsy database (i.e., the measures were not specifically designed to measure the theory's constructs) to create scales measuring thwarted belongingness, perceived burdensomeness, and acquired capability. Results indicated that scores on the acquired capability scale differentiated between cases (those who died by suicide) and controls. The items on the Acquired Capability scale assessed suicide preparatory behaviors, past suicide attempts, exposure to suicidal behavior, and impulsivity. The thwarted belongingness and perceived burdensomeness scales did not differentiate between cases and controls.

The current paper tests the IPTS with regards to the second half of life. We used a psychological autopsy database (Conwell et al., 2010; Duberstein, Conwell, Conner, Eberly, & Caine, 2004) containing data from adults aged 50 or older who died by suicide as well as living matched controls (matched on age, gender, race, and county of residence). We created three composite variables, "thwarted belongingness," "risk for burdensomeness," and "painful and provocative experiences" by using as many of the risk factors as possible from the *a priori* definition of these constructs as described by Van Orden et al. (2010). Not all variables posited by Van Orden et al., (2010) were available given that the database used was not designed with the IPTS in mind. For this reason, the composite variable for perceived burdensomeness was qualified by "risk for" because all of the available variables were situations that place individuals at risk for perceiving oneself to be a burden on others (e.g., physical illness and functional impairment). We used each participant's scores on the thwarted belongingness, perceived burdensomeness, and painful and provocative experiences variables to differentiate between case and control status. We hypothesized that each of the theory's constructs would predict case status independently, and simultaneously while controlling for Major Depression.

The theory is commonly presented as an "interaction model" in which the primary prediction involves the three-way interaction of thwarted belongingness, perceived burdensomeness, and acquired capability. However, examining this prediction is not a requirement of testing the theory. Instead, the theory proposes (i.e., the final hypothesis of the interpersonal theory of suicide in Van Orden et al., 2010) that the mental state most likely to result in suicide deaths is one characterized by thwarted belongingness, perceived burdensomeness, hopelessness about these two states and a reduced fear of death. Further, when combined with increased physical pain tolerance this mental state is likely to result in suicide. This hypothesis creates corollaries that are also testable—namely that if this hypothesis is correct, it should also be the case that thwarted belongingness, perceived burdensomeness, and painful and provocative experiences should be more common among those who die by suicide compared to living controls. It is for this reason that our primary analyses tested the main effects of thwarted belongingness, perceived burdensomeness, and painful and provocative experiences. As our sample size was relatively small, we did not test interactions.

Method

Participants

Participants were 86 case-control matched pairs who were residents of upstate NY ages 50 and over. Pairs were individual-level matched on age (plus or minus five years), gender, race, and county of residence. Of the 86 pairs, 63 were male and 23 were female. In regard to race, 97.6% of the case-control pairs were white.

Cases were suicide decedents consecutively identified by the Chief Medical Examiners of Monroe and Onondaga, NY counties between December 11, 1996 and January 20, 2001. A total of 137 cases were originally identified and next of kin were sent information letters inviting them to participate in the study. Next of kin identified the most suitable proxy respondent(s) capable of providing detailed information about the deceased. Of the initial pool of 137 cases, 14 of the proxy respondents could not be reached and 37 proxies refused. Case participants were, on average, 68.02 years of age (SD=13.20). There were no significant differences between cases included and excluded on age (excluded mean age 64.3, SD=11.5) or gender (78% male).

Information was collected from, on average, 3.34 (SD=1.10) sources of information (informants and records) for suicide decedents. Of the proxies for the 86 cases, 32 (37%) spouses or partners, 37 (43%) children, 13 (15%) siblings, 38 (44%) other relatives or friends, and 10 (12%) health care providers were interviewed. Facility records were reviewed for 78 (91%) of the 86 cases. Of the respondents, 33 (38.37%) lived with the decedent and 69 (80.23%) had spoken with the deceased within one week prior to his or her death. There were, on average, 15 days (SD=11.31) separating the suicide decedent's death and the first of the proxy interviews.

Control participants were identified by random digit dialing. They were told the study involved discussing personality, mood, recent life events, and medical history, as well as having the researcher speak with two people of his/her choice (informants) to determine if such informants can provide accurate information. In order to more closely match the source of the data of the case participants, control participants identified proxy respondents capable of providing detailed information about him or her. Control participants were, on average, 67.17 years of age (SD=12.58). On average, 3.26 (SD=.94) sources of information were used to collect information for living controls. Of the proxies for the 86 controls, 49 (57%) spouses or partners, 51 (59%) children, 9 (10%) siblings, and 55 (64%) other relatives or friends were interviewed. Facility records were reviewed for 74 (86%) of the 86 controls. Fifty-four (62.79%) of control respondents lived with and 84 (97.67%) had spoken directly with the control participant during the week prior to the interview.

There were no significant differences between cases and controls in the number of sources of data. However, control proxies were more likely than case proxies to have seen the participant in the week prior to his or her death or, for controls, the interview ($\chi^2_{(1,172)}$=13.31, p=.000). Spouse or partners were more likely to be interviewed for control participants ($\chi^2_{(1,172)}$=6.74, p=.009) while health care providers were more likely to be interviewed for case participants ($\chi^2_{(3,172)}$=10.62, p=.014).

Procedures

Data were obtained using the psychological autopsy method in which data are collected postmortem using proxy respondents and record reviews (Schneidman, 1994). The premise of the psychological autopsy is that by reviewing information pertaining to the deceased's state of mind prior to his or her death, a determination about the mode of death could be determined and suicides more validly and reliably identified. Applied to research, the psychological autopsy method expands on this premise to more fully understand the social and psychological circumstances surrounding an individual's suicide. The psychological autopsy research method has been used to study the role of factors such as mental disorders, stressful life events, personality traits, social support, indicators of suicidal intent, and other correlates of suicide (see Conner et al., 2011; 2012 for a review). Studies support the validity of the psychological autopsy research method in obtaining data from proxy respondents, finding concordance between proxy and participant reports of psychiatric symptoms, previous suicidal behavior, impulsiveness, aggression, social support, and life events (Brent et al., 1993; Conner, Conwell, & Duberstein, 2001b; Conner, Duberstein, & Conwell, 2001b; Plassman, Williams, Burke, Holsinger, & Benjamin, 2010).

Information for the current study was collected from proxy respondents and medical and psychiatric record reviews. Written informed consent was obtained from proxy respondents and next of kin to review medical records and for interviews. Study personnel who were highly trained in the study procedures conducted semi-structured interviews with proxy respondents using a standard protocol developed for the current study. Interviews were conducted either in person or via telephone and lasted between one and one-half to two and one-half hours. Instruments developed using a self-report survey format were administered using an interview format and all items were reworded to the third person (i.e., "Would [participant's name] have said that he/she was close to his/her family and friends?").

Measures

Duke Social Support Index—(Koenig et al., 1993). The Duke Social Support Index (DSSI) contains subscales assessing the frequency of phone and in-person contact with friends and family (Social Interactions Scale, 4 items scored no contact, between 1 and 4 contacts, and greater than 5 contacts) and how often the subject felt emotionally supported by and close to family and friends (Perceived Social Support Scale, 7 items scored hardly ever, some of the time, and most of the time. The distributions of the subscales are as follows: the Social Interactions subscale was roughly normally distributed (skew = 0.25, kurtosis = 2.98), while the Perceived Social Support (skew = 0.88, kurtosis = 2.74) was less normally distributed. Koenig and colleagues (1993) report adequate internal consistencies (i.e., .71 to .81) for the subscales across both physically healthy and sick older adults, as well as convergent validity in terms of negative associations of the subscales with mental distress. The Perceived Support Scale has also been found to predict onset of functional disability in older adults (McLaughlin et al., 2012). Conner and colleagues (2001a) examined the validity of proxy respondents' scores on these subscales and found acceptable concordance between respondents and proxies for the Social Interaction subscale; they found that proxy respondents significantly under-reported the levels of perceived emotional support.

Physical Self-Maintenance Scale—(PSMS; Katz et al., 1963) The PSMS is an eight item scale that was used to assess activities of daily living (ADL's)—toileting, feeding, dressing, grooming, physical ambulation, and bathing). This variable was coded as follows: the presence of any degree of impairment in any of the ADL's versus no impairment (i.e., dichotomous coding). McCall and colleagues (2002) provide validation data for the use of proxy respondents for these scales by comparing self- and proxy-reported responses; they reported acceptable concordance.

Instrumental Activities of Daily Living Scale—(Lawton & Brody, 1969). This scale measures functional capacity in instrumental activities of daily living – telephone use, shopping, food preparation, housekeeping, laundry, meal preparation, ability to use transportation independently, medication management, and ability to manage finances. As with the ADL variable, this variable was coded as follows: any degree of impairment in any of the IADL's versus no impairment was coded for this variable (i.e., dichotomous coding). McCall and colleagues (2002) provide validation data for the use of proxy respondents for these scales by comparing self- and proxy-reported responses and again reported acceptable concordance.

Aggression was assessed with the *Overt Aggression Scale* (Yudofsky, Silver, Jackson, Endicott, & Williams, 1986). This is a 4-item scale requesting information on the degree to which the subject was aggressive towards self, others, and inanimate objects including verbal (e.g., shouting and cursing) and physical (e.g., throwing and breaking objects, attacking others). Items were scored continuously based on the degree of severity of the aggressive behaviors. Both aggression in the prior month and in general were assessed. This scale was designed to be completed by an informant. Yudofsky and colleagues (1986) report high inter-rater reliability. The distribution of scores was skewed (6.6) and kurtotic (61.08). Thus, this variable was dichotomized as present (score >=1) or absent (score=0).

Depression was assessed using the *Structured Clinical Interview for DSM-IV* (First, Spitzer, Miriam, & Williams, 2002). Specifically, diagnoses of Major Depressive Disorder were made using a consensus process with data from the SCID. Conner and colleagues (2001a) report high levels of concordance between respondent and proxy reports for diagnoses of Major Depression among suicide attempters and family/friend proxies.

Data Analysis—We created three composite variables to predict case status using conditional logistic regression, which accounts for the paired nature of the data. We estimated conditional logistic regression models for each construct first independently (while covarying for depression diagnosis), then simultaneously in a single model. Given our sample size, we decided to constrain our analyses to the main effects. Conditional logistic regression models were conducted using STATA version 11.

Missing data was minimal as data were collected via interviews with highly trained assessors. For the perceived burdensomeness composite variable, most indicators had no missing values, with the following exceptions: IADL's (2 missing values) and in-home nursing (1 missing value), leaving 3 pairs with missing data on the burdensomeness variable. For the belongingness composite, missing data was as follows: Social Interaction score (4

missing values) and Perceived Social Support score (5 missing values), leaving 6 pairs with missing data on the belongingness variable. For the painful and provocative experiences variable, 14 pairs had missing values due to missing data on firearm ownership.

Results

Table 1 includes descriptive information on all variables used to construct composite scores by case status. Of the 52 suicide decedents who reportedly owned a firearm, 38 (73.1%) were identified as having used a firearm in their suicide. None of the suicide decedents who reportedly did not own a firearm were identified as having used a firearm in their suicide.

In three separate models, each of the constructs independently distinguished between case (coded =1) versus control status (coded=0): thwarted belongingness (OR=2.14, p <0.001; OR for depression = 17.59, likelihood ratio [LR] chi-square=66.75; p<.01), risk for perceived burdensomeness (OR=5.09, p < 0.001; OR for depression = 38.00, LR chi-square=74.29, p<.01) and painful and provocative experiences (OR=3.08, p < 0.001; OR for depression = 28.84, LR chi-square=61.02, p<.01).

In a model with all three constructs entered simultaneously as well as Major Depression (LR chi-square=80.44), risk for burdensomeness (OR=3.93, p <.05) and painful and provocative experiences (OR=4.16, p <.05) were significant predictors of suicide case versus control status, while belongingness (OR=1.74, p=0.13) and depression (OR=9.21, p=0.08) were not significant predictors.

Discussion

The current study is the first case-controlled examination of the IPTS in later life and one of only a few studies that examines the theory in relation to the outcome of suicide. We found that all three of the theory's constructs predicted suicide case status when examined independently (while covarying for Major Depression). Further, in a model with all three constructs plus Major Depression entered simultaneously, risk for burdensomeness and painful and provocative experiences remained significant predictors of suicide. In all instances, higher levels of the composite variables were associated with a greater likelihood of suicide case status (vs. control).

The final hypothesis of the IPTS states that the mental state most likely to result in suicide involves the combined presence of thwarted belongingness, perceived burdensomeness, hopelessness about these two states, and a reduced fear of death. As described in the introduction, this hypothesis is associated with corollaries that are testable—if the final hypothesis of the theory is correct, it should be the case that thwarted belongingness, perceived burdensomeness, and the experience of painful and provocative experiences should be more common among those who die by suicide compared to living controls. The current findings support these corollaries.

The theory also proposes that the constructs should predict suicide over and above the contribution of mental disorders. Accordingly, when Major Depression was included, risk for burdensomeness and painful and provocative experiences remained significant predictors

of suicide (vs. control) status. Perhaps more importantly is that in combination, Major Depression was not significantly associated with case status. This finding is consistent with the theory's proposal that risk factors, such as Major Depression, increase suicide risk by increasing thwarted belongingness, perceived burdensomeness, and/or painful and provocative experiences. The prior study to examine suicide deaths using a psychological autopsy method (Nademin et al.) did not include depression as a covariate, thereby precluding direct comparisons across studies.

Although thwarted belongingness predicted status independently; this effect was no longer significant when depression and the other IPTS constructs were included in the model. This might suggest that although thwarted belongingness does play a significant role in the development of suicide risk, perceived burdensomeness may be more primary for adults in the second half of life. Older adults experience declines in physical and cognitive function. Although older adulthood is associated with greater levels of positive emotions (e.g., Carstensen et al., 2011), the presence of greater functional declines make some older adults more vulnerable to experiencing perceived burdensomeness. Furthermore, older adults, particularly men who comprised the majority of the current sample, may place significant importance on continuing to contribute. Such importance may make functional declines even more difficult to accept and result in more severe perceived burdensomeness. Alternatively, the burdensomeness composite variable was more accurately termed risk for perceived burdensomeness due to the nature of the variables. It is possible that these variables themselves (e.g., impairments in activities of daily living, required home nurse visits) are associated with risk for death by suicide independent of any mediating effect through perceptions of burdensomeness.

The current findings support the consideration of the IPTS in clinical practice. One of the most novel features of the IPTS is its attempt to explain why people do not die by suicide despite the presence of risk factors. The theory's distinction between the desire and the capability for suicide may help improve specificity in risk assessment and is consistent with the growing awareness of the distinction between distal, proximal, and acute risk factors for suicide. Given that a high proportion of older adults who die by suicide are seen in primary care in the months and weeks before their deaths (Luoma, Martin, & Pearson, 2002), primary care physicians, when discussing depression and suicide risk, could consider bringing up the topic of perceived burdensomeness, as a malleable target for reducing suicide risk.

The current findings also suggest that risk factors for perceived burdensomeness and painful and provocative experiences are of unique importance for adults in the second half of life. Intervening with perceptions of burdensomeness on others may hold promise for ameliorating suicide risk in later life. Behavioral techniques such as problem solving interventions that include caregiver involvement might facilitate contributions to the well-being of others and independence (e.g., Kiosses, Teri, Velligan, & Alexopoulos, 2011). Cognitive therapy (CT) strategies, which have been adapted for older adults with suicide risk (Bhar & Brown, 2012), could be used to counter the "black and white" thinking that is inherent in labeling oneself a complete burden on others (when in reality our impacts on others are generally mixed and change over time). Interpersonal Psychotherapy (IPT) has

also been adapted for older adults with suicide risk (Heisel et al., 2014). IPT's focus on role transitions could allow older adults who developed perceptions of burdensomeness in the context of increasing functional decline and increasing reliance on others to emotionally process this change in their lives and create more realistic expectations of their interpersonal relationships. Finally, opportunities to make a positive contribution in the lives of others and thereby counter perceptions of burdensomeness should be available to all older adults, such as through volunteerism, which is associated with numerous health benefits in later life (Anderson et al., 2014).

The primary limitation of the current study was a small sample size and corresponding limited statistical power. As with all studies of suicide, achieving large sample sizes is a challenge given that suicide is a rare event. Another key limitation inherent to the psychological autopsy method was the reliance on proxy respondents and medical record reviews to estimate subjects' contextual, interpersonal, and intrapersonal states prior to his or her death. Such reliance introduces a number of potential confounds including questionable reliability and validity of assessment tools completed with proxy respondents, time between the individual's death and collection of data, and the potential for recall bias for those coping with the suicide of a loved one (Hawton et al., 1998; Hjelmeland, Dieserud, Dyregrov, Knizek, & Leenaars, 2012). Although the majority of proxies had contact with the participant within the week prior to his or her death (or for controls, the interviews), a greater number of control proxies had done so. Although this asymmetry is theoretically interesting given the strong support for thwarted belongingness in determining case status, it may introduce variability in the validity of the data between groups.

Although a major strength of the current study was the *a priori* nature by which indicators of the constructs were selected, data were not collected with the IPTS in mind. This reduced our ability to capture the core of the construct of perceived burdensomeness because beliefs about burdensomeness were not measured in the present sample. Further, given that we used a pre-existing dataset, we were not able to purposefully select a comparison group such as older adults who died of other causes, which could potentially provide a more stringent test of the theory's hypotheses by focusing suicide vs. all cause mortality. Finally, although a strength with regards to furthering research on late-life suicide, the use of a sample aged 50 and above limits the generalizability of this test of the theory to older adults.

Suicide is a leading cause of death worldwide and represents a significant public health problem. The current findings suggest that the IPTS is a comprehensive framework that may be useful in understanding late-life suicide risk. Our results support including items assessing thwarted belongingness, perceived burdensomeness and acquired capability into large, population based data collection projects; thus, yielding large enough sample sizes to examine suicide deaths as an outcome while controlling for other risk factors, especially depression. Alternatively, or simultaneously, intervention studies that aim to reduce thwarted belongingness and perceived burdensomeness or block the expression of acquired capability could provide experimental evidence linking the constructs to amelioration of suicide risk. Many studies testing the theory continue to focus on suicide ideation and attempts as outcomes. We urge researchers and funding agencies to dedicate time and resources to

examine suicide deaths, as this is the only means to fairly falsify, or support, the IPTS, and thereby contribute to suicide prevention science.

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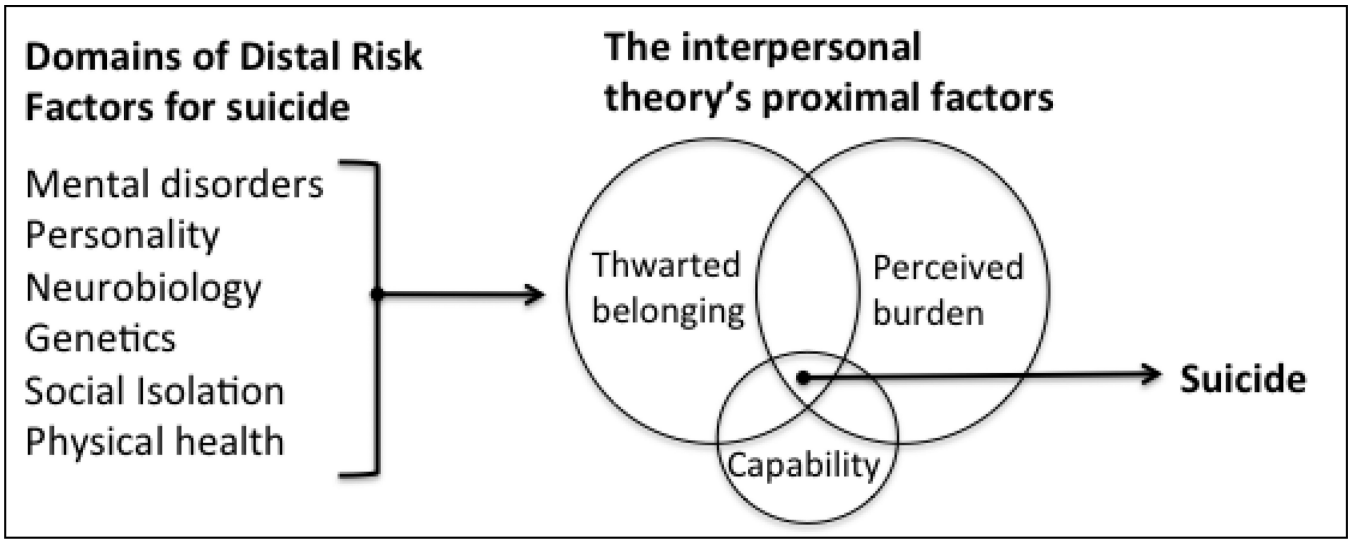

Figure 1.
Conceptual model

Table 1

Descriptive Statistics by Case status

	Suicide Case Mean (SD)/ Frequency (%)	Control Mean (SD)/ Frequency (%)	Odds Ratio [95% CI] Case (1) Vs. Control (0)	Variable Range
Depression Symptom Count	5.08 (2.76)	0.31 (0.79)	2.66 [1.63–4.36]	0–9
Thwarted Belongingness				
DSSI-Social Interactions	0.29 (0.90)	−0.29 (1.02)	1.88 [1.33–2.70]	−2.45–2.53
DSSI-Perceived Social Support	0.62 (1.03)	−0.59 (0.47)	7.39 [3.93–13.88]	−1.09–2.61
Perceived Burdensomeness				
IADL Impairment	68 (79.1%)	21(24.4%)	16.67 [5.20–54.43]	0–1
ADL Impairment	71 (86.6%)	24 (29.3%)	6.17 [2.60–14.61]	0–1
Visiting Nurse	10 (12.2%)	2 (2.4%)	5.00 [1.10–22.82]	0–1
Painful and Provocative Experiences				
Number of previous attempts	0.55 (1.24)	0.02 (0.15)	10.48 [1.55–70.70]	0–6
General Aggression	1.98 (4.72)	.34 (.82)	1.46 [1.12–1.90]	0–36
Relative died by suicide	19 (22.0%)	12 (14.0%)	1.75 [0.79 – 3.87]	0–1
Owned firearm in prior month *	52 (62.7%)	33 (41.3%)	2.40 [1.27–4.48]	0–1

Note:

DSSI=Duke Social Support Index, note scores were z-transformed for the DSSI; HAM=Hamilton Rating Scale for Depression (number of DSM depression symptoms coded as present), IADL=Instrumental Activities of Daily Living (coded as presence of 1+ impairments), ADL=Activities of Daily Living (coded as presence of 1+ impairments), Frequencies of those positively endorsing item (or using the service) in the prior month are provided.

* Data was missing for 3 subjects in the case arm and 6 subjects in the control arm.