

# **Incorporating psychopathology into the interpersonal-psychological theory of suicidal behaviour (IPTS)**

Philip J. Batterham, Alison L. Calear

Centre for Mental Health Research, Research School of Population Health, The Australian National University, Canberra Australia

*Corresponding author:* Philip Batterham  
Centre for Mental Health Research  
Research School of Population Health  
63 Eggleston Road  
The Australian National University  
Acton ACT 2601 AUSTRALIA  
Tel.: +61 2 61251031  
Fax: +61 2 61250733  
Email: philip.batterham@anu.edu.au

*Word count:* 3,636

*Conflicts of interest:* None

*Funding:* This study was supported by National Health and Medical Research Council (NHMRC) grant 1043952, and by an NHMRC Centre of Research Excellence in Suicide Prevention 1042580. PJB and ALC are supported by NHMRC fellowships 1158707 and 1122544.

*Contribution:* PJB designed and oversaw the study, conducted the analyses and drafted the manuscript. ALC contributed to the design and management of the study and critically revised the manuscript. All authors approved of the final manuscript.

*Acknowledgements:* We are very grateful to Ella Kurz for providing input and editing for the manuscript.

## **Abstract**

**Background:** The interpersonal-psychological theory of suicidal behaviour (IPTS) posits that the joint presence of perceived burdensomeness (PB), thwarted belongingness (TB) and capability for suicide (CS), is necessary for suicide attempt. Emerging evidence demonstrates these effects are not consistently observed. Psychopathology may independently impact on the explanatory power of the IPTS constructs.

**Aims:** The aims of the current study were to assess whether the inclusion of psychopathology indicators into the IPTS explains additional variance in recent suicide attempt, and to assess the relative influence of interpersonal-psychological constructs versus mental illness on suicide attempt.

**Method:** Australian adults (N=1,323; 77% female) who reported suicidal ideation in the past year were recruited using social media advertising to complete an online cross-sectional survey.

**Results:** None of the predicted IPTS interactions was significantly associated with recent suicide attempt, although PB and CS had significant independent associations. The addition of psychopathology indicators to the IPTS model explained significant additional variation in suicide attempt (18% vs. 14%).

**Conclusions:** The influence of psychopathology on suicide attempt may be insufficiently explained by interpersonal-psychological constructs. The IPTS may have greater explanatory power to identify transitions from suicidal ideation to suicide attempt after accounting for mental illness.

*Key words:* suicide attempt, perceived burdensomeness, thwarted belongingness, capability for suicide, mental disorders

Suicide is a complex phenomenon with considerable burden on individuals and communities. With at least 800,000 suicide deaths and at least 20 attempts for each death (World Health Organization, 2014), better identifying the factors associated with suicidal behaviour is a key imperative for improving prevention efforts and developing better treatment options at the individual, interpersonal and community levels. One of the key challenges of contemporary theoretical models of suicide is to identify the factors associated with the progression from suicidal ideation to suicide attempt. The interpersonal-psychological theory of suicidal behaviour (IPTS) posits that the joint presence of three interpersonal factors is necessary for the development of suicidal behaviours (Joiner, 2005; Van Orden et al., 2010). According to the IPTS, suicidal desire emerges from a combination of two key interpersonal factors: thwarted belongingness (TB), which is a state of alienation, or unmet need for social connectedness; and perceived burdensomeness (PB), the state of feeling that that one's existence is a burden on friends, family members, and/or society (Van Orden et al., 2010). Suicidal behaviour is theorised to only emerge when suicidal desire is experienced in the presence of the third factor, capability for suicide (CS), which refers to the ability to overcome the inherent drive for self-preservation and engage in lethal self-injury through repeated exposure and habituation to physically painful and/or fear-inducing experiences (J. Ma, P. J. Batterham, A. L. Cleave, & J. Han, 2016; Selby et al., 2010).

However, there is mixed evidence as to whether capability for suicide is a robust predictor of suicide attempt (Chu et al., 2017; J. Ma et al., 2016; Stewart, Eaddy, Horton, Hughes, & Kennard, 2017). Evidence for the combined effects of CS, TB and PB on suicide attempt is sparse, with few studies finding a significant three-way interaction (J. Ma et al., 2016). A recent review has indicated that PB in particular might have associations with both ideation and attempt (J. Ma et al., 2016). While suicide theory like the IPTS is highly relevant for suicidologists in that it can identify meaningful targets for intervention at both the individual and population levels (Klonsky, 2019), it is possible the IPTS may not be as clearly defined nor supported as initially thought (J. S. Ma, P. J.

Batterham, A. L. Calear, & J. Han, 2016). Science demands that we continue to refine and improve theories (Klonsky, 2019).

There is strong evidence that many mental disorders are associated with suicide attempt and suicide death (Chesney, Goodwin, & Fazel, 2014; Harris & Barraclough, 1997; Nock, Hwang, Sampson, & Kessler, 2010). However, after accounting for presence of suicidal ideation, the evidence for independent associations of specific mental disorders with suicide attempt becomes less clear, with research suggesting that PTSD, OCD, conduct disorder and substance use disorders may have substantial impacts on the development of suicide attempt (Batterham, Calear, Christensen, Carragher, & Sunderland, 2018; Hoertel et al., 2015; May & Klonsky, 2016; Nock et al., 2010).

There is also limited research on the relative impact of psychopathology compared to interpersonal risk factors on suicide attempt. There is likely to be considerable interplay between mental health and interpersonal functioning, with Christensen et al. (2014) suggesting that the effects of mental health problems on suicidal ideation and attempt may be mediated by perceived burdensomeness.

Considering the sparsity of evidence showing a significant interaction between the IPTS factors on suicide attempt, the current study investigates whether the inclusion of mental illness indicators into the IPTS could explain additional variance in suicide attempt. The study includes data from a survey of 1323 Australian adults recruited from the general population who reported suicidal ideation in the past year, selected from among a larger sample of 3620 adults. Of these 1323 adults, 138 reported a recent suicide attempt in the past year. Within this sample of 1323 adults, the aims of the current study were: (1) to assess whether the inclusion of mental illness indicators into the IPTS explains additional variance in suicide attempt, and (2) to assess the relative influence of interpersonal factors versus mental illness on suicide attempt.

## **Method**

### ***Participants and procedure***

Participants were recruited without incentives, using advertisements on the online social media platform *Facebook* in January-February 2016. The study was advertised to potential participants as a mental health research study. Advertisements linked directly to the online survey and targeted Australian adults aged  $\geq 18$  years (for further details of the recruitment process, see Batterham, Sunderland, Slade, Calear, & Carragher, 2018). Ethical approval was obtained from the ANU Human Research Ethics Committee (protocol #2015/717).

Prior to obtaining consent, a participant information sheet was provided, outlining survey involvement, noting that: (i) participation was optional and anonymous, (ii) participants could exit the survey at any time, (iii) the survey contained sensitive mental health questions, and (iv) the survey took 40-60 minutes to complete. The sheet also included a list of local and national mental health resources, which were also reiterated in the middle and at the end of the survey. From 7,174 individuals who clicked on the survey link, 5,220 (73%) commenced the survey and 3,620 (50%) completed the full survey. The survey included measures assessing specific mental disorders, suicidality (including the measures described below), psychological distress, fatigue, sleep disturbance, help seeking, disclosure, demographics and personality.

### ***Measures***

*Suicidal ideation and suicide attempt.* Suicidality in the past year was assessed using the suicide items from the Psychiatric Symptom Frequency scale (Lindelow, Hardy, & Rodgers, 1997). Specifically, presence of suicidal ideation was based on a response of “yes” to the question “In the last year have you ever thought about taking your own life?”. Participants reporting no suicidal ideation ( $n=2297$ ) were excluded from the current analyses, leaving an analysis sample of  $n=1323$ .

Suicide attempt was based on a response of “yes” to the question, “In the last year have you ever attempted to take your own life?”.

*Interpersonal-psychological risk factors.* Thwarted belongingness (TB) and perceived burdensomeness (PB) were measured using the 15-item form of the Interpersonal Needs Questionnaire (INQ-15; Van Orden, Cukrowicz, Witte, & Joiner, 2012). The INQ-15 consists of nine items that assess TB and six that assess PB on a scale from 1 (not at all true for me) to 7 (very true for me), with higher scores indicating greater TB (range 9-63) and PB (range 6–42). In comparison to other versions of the INQ, the INQ-15 has been found to have a more consistent factor structure (Hill et al., 2015). In this sample, the TB subscale ( $\alpha = .92$ ), and PB subscale ( $\alpha = .95$ ) both had excellent internal consistency. Capability for suicide (CS) was measured using the Acquired Capability for Suicide Scale – Fearlessness About Death (ACSS-FAD), a seven-item scale that has previously been shown to have acceptable psychometric properties in assessing capability for suicide (Ribeiro et al., 2014). Scores on the scale range from 0-28, with higher scores indicating greater capability for suicide. The ACSS-FAD had acceptable internal consistency in the present sample ( $\alpha = .79$ ).

*Clinical criteria for mental disorders.* Clinical diagnosis was assessed using a DSM-5 symptom checklist, developed by the authors as a self-report assessment for clinical diagnosis based on DSM-5 criteria (Batterham, Calear, et al., 2018). The checklist queried respondents about the presence or absence of symptoms based directly on DSM-5 definitions for each disorder of interest, and used DSM-5 criteria to determine whether each disorder was present (1) or absent (0). There were eight checklist items used to assess social anxiety disorder (SAD), 21 for panic disorder (PD), 14 for generalized anxiety disorder (GAD), 15 for major depressive disorder (MDD; including items to exclude hypomania), 22 for post-traumatic stress disorder (PTSD), 14 for obsessive-compulsive disorder (OCD), 21 for adult attention deficit hyperactivity disorder (ADHD), 16 for alcohol use

disorder (AUD), and 17 for substance use disorder (SUD). Each item reflected a single DSM-5 criterion for the disorder of interest, although some criteria were probed across multiple questions and additional items were used to exclude alternative diagnoses. Example items included as follows: ‘In the past six months, did social situations nearly always make you feel frightened or anxious?’, ‘During the past six months, has your behaviour or difficulty in paying attention caused problems at home, work, school, or socially?’ and ‘In the past month, has there been a time when you unexpectedly felt intense fear or discomfort?’. The checklist was designed along similar principles to the electronic version of the Mini International Neuropsychiatric Interview (MINI; Zbozinek et al., 2012) in terms of structure (binary and categorical self-report items with conditional skip logic) and response burden. However, the checklist used in the current study was developed independently from the MINI, is non-proprietary and based on DSM-5 rather than DSM-IV criteria. As with the electronic MINI, the checklist has not yet been validated against DSM-5 clinician diagnosis or structured clinical interview, but contains items reflecting each of the symptom criteria used in DSM-5 to generate a diagnosis. The full checklist has been published previously (Batterham, Calear, et al., 2018) and is available from the authors.

### ***Statistical analyses***

Five logistic regression analyses were conducted, all examining the outcome of suicide attempt among individuals reporting suicidal ideation. Model 1 included the main effects of the three interpersonal-psychological factors. Model 2 included the main effects and 2- and 3-way interactions between the three interpersonal-psychological factors. Model 3 included binary indicators for the nine mental disorders. Model 4 was a combination of Models 1 and 3 (main effects of interpersonal and psychopathology factors) and Model 5 added interaction terms (i.e., Models 2+3). The analyses were restricted to individuals reporting suicidal ideation, so that we could assess the effects of interpersonal and mental health characteristics on the transition from suicidal ideation to suicide attempt. Including participants without suicidal ideation may lead to the

model accounting for shared variance with suicidal ideation, as all individuals with suicide attempt reported suicidal ideation (Batterham et al., 2018a). Nevertheless, to examine the influence of restricting the sample to individuals with suicidal ideation, analyses were repeated in the full sample ( $N=3,620$ ). Nested models were compared based on difference in  $-2$  Log Likelihood, with Nagelkerke  $R^2$  also examined as an indicator of model fit.

## **Results**

Sample characteristics are provided in Table 1, based on absence or presence of suicide attempt. The complete sample of individuals reporting suicidal ideation ( $N = 1323$ ) had an overrepresentation of females, which may reflect the recruitment approach and the higher prevalence of suicidal ideation reported by females. There was also underrepresentation of adults aged 65 years or older. Presence of psychopathology was considerably higher than would be expected in the general population, although it is unclear if prevalence rates were representative of people who experience suicidal thoughts. Otherwise, the sample was largely reflective of the Australian population. Sociodemographic factors associated with greater prevalence of suicide attempt in this sample were younger age, non-binary gender, lower educational attainment, and being unemployed. Meeting criteria for any mental disorder was associated with significantly greater prevalence of suicide attempt, with the exceptions of depression, panic disorder and alcohol use disorder. Higher scores on all three interpersonal-psychological constructs were also associated with significantly greater prevalence of suicide attempt. Correlations between continuous IPTS measures are provided in Table 2, including biserial correlations with suicide attempt and psychopathology indicators. There was a strong correlation between TB and PB (0.56), and weak-moderate correlations of most psychopathology indicators with TB and PB. CS tended to have weak correlations with all variables. SA was moderately correlated with PB, but only weakly correlated with TB and CS.

The five logistic regression models are provided in Tables 3-7. All three interpersonal-psychological constructs were significantly associated with suicide attempt (Table 3). However, contrary to the IPTS hypotheses, TB had a negative association with suicide attempt after accounting for PB and CS, suggesting that high TB may be protective against suicide attempt among individuals with suicidal ideation and high PB. In the model that included interaction terms, the critical test of the theory that all constructs need to be present for a suicide attempt to occur (Table 4), none of the variables was significant. The psychopathology model in Table 5 indicates that only PTSD, OCD and SUD had significant independent associations with suicide attempt among individuals with ideation, after accounting for all other disorders that were assessed. In accounting for both interpersonal-psychological factors and psychopathological factors (Table 6), only SUD, PB and CS significantly increased the odds of suicide attempt. In particular, a one-unit increase in PB was associated with 9% increase in the odds of suicide attempt, or a 90% increase associated with a one-SD increase in PB. After accounting for all other variables in the model, depression and TB had a protective effect on suicide attempt. Finally, after adding IPTS interaction terms (Table 7), only the effects of SUD (risk) and depression (protective) remained significant.

In comparing across models, adding interaction terms for the IPTS constructs did not significantly improve model fit (Model 1 vs Model 2:  $\chi^2 = 6.3$ ,  $df = 4$ ,  $p = 0.18$ ; Model 4 vs Model 5:  $\chi^2 = 7.4$ ,  $df = 4$ ,  $p = 0.11$ ). Adding IPTS constructs to the psychopathology indicators improved model fit (Model 1 vs Model 4:  $\chi^2 = 62.3$ ,  $df = 3$ ,  $p < 0.001$ ). Similarly, adding psychopathology indicators to the IPTS constructs also improved model fit (Model 3 vs Model 4:  $\chi^2 = 28.2$ ,  $df = 9$ ,  $p = 0.001$ ).

Models were re-estimated in the complete sample ( $N=3,620$ ) to examine whether findings were consistent after including participants without suicidal ideation. Outcomes were largely consistent with models restricted to individuals reporting suicidal ideation. However, in Models 1 and 4, the main effect of TB was no longer significant (M1:  $OR = 0.99$ ,  $\chi^2 = 0.7$ ,  $p = 0.41$ ; M4:  $OR = 0.98$ ,  $\chi^2$

= 2.7,  $p = 0.10$ ). In Model 2, the main effects of both TB ( $OR = 1.11, \chi^2 = 5.3, p = 0.021$ ) and PB ( $OR = 1.24, \chi^2 = 5.8, p = 0.016$ ) were significant, although CS and interaction terms remained non-significant. In Model 3, the effects of PTSD, OCD and AUD remained significant, while GAD ( $OR = 2.08, \chi^2 = 11.7, p < 0.001$ ), SAD ( $OR = 1.85, \chi^2 = 8.2, p = 0.004$ ) and ADHD ( $OR = 1.58, \chi^2 = 4.8, p = 0.028$ ) also had significant effects on suicide attempt. A significant effect for GAD also emerged in Models 4 and 5 (Model 4:  $OR = 1.67, \chi^2 = 5.1, p = 0.024$ ; Model 5:  $OR = 1.59, \chi^2 = 4.2, p = 0.040$ ), while other effects remained consistent.

## **Discussion**

The IPTS constructs explained significant variance in suicide attempt (14%). However, the predictions of the IPTS were not supported, as none of the critical interactions between the interpersonal-psychological constructs was significantly associated with recent suicide attempt among individuals experiencing suicidal ideation. Including interaction terms in the model did not improve model fit and attenuated all main effects to non-significance. However, the findings do indicate that the interpersonal-psychological construct of PB in particular, along with CS, is an important indicator of risk for suicide attempt among individuals experiencing suicidal ideation. These findings are somewhat in contrast to a review of the IPTS predictions (J. Ma et al., 2016) that identified limited evidence for PB on suicide attempt, although the effect of CS on attempt was consistent with the broader literature. The possible protective effect of TB on suicide attempt was a curious finding. This finding might indicate that individuals who have a perception that they are a significant burden on others, but have weak connections to other people may have a lesser overall sense of interpersonal liability, and therefore may be less likely to engage in suicidal behaviour. However, further investigation of this phenomenon is warranted, and effects of TB were largely non-significant when participants without suicidal ideation were included in the model.

The combining of interpersonal constructs with psychopathology indicators explained additional variation in suicide attempt (18%), although considerable variance remained unexplained. The present findings on the role of mental disorders on suicide attempt are largely consistent with a growing body of literature suggesting that trauma, OCD symptoms and externalising disorders are more strongly associated with transition from suicidal thoughts to suicide attempt than other forms of psychopathology including depression (Batterham, Calear, et al., 2018; Hoertel et al., 2015; May & Klonsky, 2016; Nock et al., 2010). OCD, PTSD and substance use may increase capability for suicidal behaviour through repetitive thinking, exposure to aversive situations, compulsion to take action, and reduction of behavioural inhibitions and impulse control (Batterham, Calear, et al., 2018; Nock et al., 2010). Individuals with OCD or PTSD may have more intrusive or repetitive thoughts about suicide, making it difficult to escape the thoughts over extended periods. It may also be the case that PTSD in particular, but also OCD and substance use, may disrupt interpersonal functioning, further increasing risk of suicidal behaviour. An interesting finding from the full model (Model 4) was that depression was protective for suicide attempt after accounting for interpersonal factors. This finding might suggest that individuals with depression and suicidal ideation may receive greater professional support, personal support or monitoring, which may reduce their risk of subsequent suicide attempt.

Overall, the findings suggest that there are important and somewhat distinct effects of interpersonal factors and psychopathology factors on the development of suicidal behaviours. There are likely to be bidirectional associations and complex interactions between mental illness and interpersonal supports or challenges (Christensen et al., 2014; Ehsan & De Silva, 2015). Viewing suicide risk as a product of mental illness or interpersonal problems in isolation may be simplistic, as demonstrated by the present findings. Moreover, the considerable unexplained variance in suicidal behaviour within the high-risk population of individuals with suicidal thoughts indicates that there remains scope to identify additional constructs, such as psychological factors (e.g., entrapment, rumination,

psychological inflexibility), personality traits (e.g., neuroticism, psychoticism, impulsivity) or cognitive factors (e.g., attention biases, imagery), which may increase an individual's propensity to transition from suicidal thinking to suicidal behaviour.

Given that other mental illnesses including PTSD and OCD, along with substance use, confer heightened levels of risk for suicide attempt among individuals experiencing suicidal ideation, clinicians may need to broaden their conceptualisations and awareness of risk for suicidal behaviour. This broadening of focus may extend to more thorough risk assessment or additional specific education around suicide prevention. Services for substance users may be poorly integrated with mental health services (Canaway & Merkes, 2010), with the current findings suggesting that drug treatment services may have a role to play in reducing suicide risk in the community. While further investigation of targeted treatments to reduce risk of suicide attempt among individuals with OCD, PTSD and/or substance use is warranted, the study findings suggest novel avenues for treatment of individuals at risk of suicidal behaviour. Specifically, therapies that target symptoms of OCD, trauma response and substance use, such as cognitive and behavioural therapies (including exposure therapy and desensitization therapies), integrated treatments for comorbid substance use and mental disorders, and motivational interviewing (Cusack et al., 2016; Lundahl, Kunz, Brownell, Tollefson, & Burke, 2010; Olatunji, Davis, Powers, & Smits, 2013) may be considered for individuals with suicidal ideation and one or more of these disorders.

The current study had a number of strengths, including the large community-based cohort of individuals with suicidal ideation, and the concurrent assessment of both a broad range of psychopathology and interpersonal needs using validated measures. The findings should also be considered in light of the limitations of the study. The cross-sectional nature of the data precludes identifying the directionality of the findings, particularly whether interpersonal factors might change before or after a suicide attempt. The IPTS is designed to prospectively identify individuals

at risk of suicidal behaviour, so the use of retrospective recall and a 12-month period is not optimal for testing the predictions of the theory. Further longitudinal research to untangle the complex interactional relationships between psychopathology, interpersonal functioning and suicidal behaviour should be a key research priority. The sample may not have been representative of the population of people who attempt suicide, particularly in terms of gender and older age groups. This lack of representativeness may have arisen from the considerable attrition between individuals clicking the link and the completion of the survey, which may reflect a selection bias toward individuals who have a personal interest or experience in mental health or suicide. The standard used to assess clinical criteria was a self-report checklist, due to the practical and financial constraints involved in conducting a large-scale population-based assessment. The checklist systematically assessed all criteria for internalising disorders based on DSM-5 criteria, similar to other tools such as the MINI. Nevertheless, self-report of DSM-5 criteria may not be consistent with clinician-administered measures, so clinician diagnosis would provide a more rigorous standard for diagnostic comparison. Single-item measures of suicidal ideation and suicide attempt were used, which may result in misclassification of suicidal behaviour (Hom, Joiner, & Bernert, 2016). Finally, less common forms of mental illness, such as psychosis, bipolar disorder and personality disorders, were not assessed in this study, and may confer additional risk for suicidal behaviour.

In conclusion, this study demonstrates the interplay between interpersonal constructs and psychopathology in suicidal behaviour among people who experience suicidal ideation. While the predictions of the IPTS were not supported by this research, interpersonal factors clearly play an important role in suicide attempt. Perceived burdensomeness in particular appears to be a pernicious factor that is strongly associated with the development of suicidal behaviour. Psychopathology also played a role in suicide attempt, with PTSD, OCD and SUD playing more important roles than mood disorders in this sample. Given the limited explanatory power of the present and previous models of suicidal behaviour, further refinement of current models of suicidal behaviour may be

warranted. Such models should ideally examine the dynamic interplay between interpersonal and psychopathological risk and protective factors.

## References

- Batterham, P. J., Calear, A. L., Christensen, H., Carragher, N., & Sunderland, M. (2018). Independent Effects of Mental Disorders on Suicidal Behavior in the Community. *Suicide Life Threat Behav*, *48*(5), 512-521. doi: 10.1111/sltb.12379
- Batterham, P. J., Sunderland, M., Slade, T., Calear, A. L., & Carragher, N. (2018). Assessing distress in the community: psychometric properties and crosswalk comparison of eight measures of psychological distress. *Psychological Medicine*, *48*(8), 1316-1324. doi: 10.1017/S0033291717002835
- Canaway, R., & Merkes, M. (2010). Barriers to comorbidity service delivery: the complexities of dual diagnosis and the need to agree on terminology and conceptual frameworks. *Aust Health Rev*, *34*(3), 262-268. doi: 10.1071/AH08723
- Chesney, E., Goodwin, G. M., & Fazel, S. (2014). Risks of all-cause and suicide mortality in mental disorders: a meta-review. *World Psychiatry*, *13*(2), 153-160. doi: 10.1002/wps.20128
- Christensen, H., Batterham, P. J., Mackinnon, A. J., Donker, T., & Soubelet, A. (2014). Predictors of the risk factors for suicide identified by the interpersonal-psychological theory of suicidal behaviour. *Psychiatry Research*, *219*(2), 290-297. doi: 10.1016/j.psychres.2014.05.029
- Chu, C., Buchman-Schmitt, J. M., Stanley, I. H., Hom, M. A., Tucker, R. P., Hagan, C. R., . . . Joiner, T. E. (2017). The interpersonal theory of suicide: A systematic review and meta-analysis of a decade of cross-national research. *Psychol Bull*, *143*(12), 1313-1345. doi: 10.1037/bul0000123
- Cusack, K., Jonas, D. E., Forneris, C. A., Wines, C., Sonis, J., Middleton, J. C., . . . Gaynes, B. N. (2016). Psychological treatments for adults with posttraumatic stress disorder: A systematic review and meta-analysis. *Clin Psychol Rev*, *43*, 128-141. doi: 10.1016/j.cpr.2015.10.003
- Ehsan, A. M., & De Silva, M. J. (2015). Social capital and common mental disorder: a systematic review. *J Epidemiol Community Health*, *69*(10), 1021-1028. doi: 10.1136/jech-2015-205868

- Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders. A meta-analysis. *Br J Psychiatry*, *170*, 205-228.
- Hill, R. M., Rey, Y., Marin, C. E., Sharp, C., Green, K. L., & Pettit, J. W. (2015). Evaluating the Interpersonal Needs Questionnaire: Comparison of the Reliability, Factor Structure, and Predictive Validity across Five Versions. *Suicide Life Threat Behav*, *45*(3), 302-314. doi: 10.1111/sltb.12129
- Hoertel, N., Franco, S., Wall, M. M., Oquendo, M. A., Kerridge, B. T., Limosin, F., & Blanco, C. (2015). Mental disorders and risk of suicide attempt: a national prospective study. *Mol Psychiatry*, *20*(6), 718-726. doi: 10.1038/mp.2015.19
- Hom, M. A., Joiner, T. E., & Bernert, R. A. (2016). Limitations of a single-item assessment of suicide attempt history: Implications for standardized suicide risk assessment. *Psychological Assessment*, *28*(8), 1026-1030. doi: 10.1037/pas0000241
- Joiner, T. E. (2005). *Why people die by suicide*. Cambridge, Mass.: Harvard University Press.
- Klonsky, E. D. (2019). The role of theory for understanding and preventing suicide (but not predicting it): A commentary on Hjelmeland and Knizek. *Death studies*, 1-4.
- Lindelow, M., Hardy, R., & Rodgers, B. (1997). Development of a scale to measure symptoms of anxiety and depression in the general UK population: the psychiatric symptom frequency scale. *J Epidemiol Community Health*, *51*(5), 549-557.
- Lundahl, B. W., Kunz, C., Brownell, C., Tollefson, D., & Burke, B. L. (2010). A meta-analysis of motivational interviewing: Twenty-five years of empirical studies. *Research on Social Work Practice*, *20*(2), 137-160. doi: 10.1177/1049731509347850
- Ma, J., Batterham, P. J., Calear, A. L., & Han, J. (2016). A systematic review of the predictions of the Interpersonal-Psychological Theory of Suicidal Behavior. *Clin Psychol Rev*, *46*, 34-45. doi: 10.1016/j.cpr.2016.04.008

- Ma, J. S., Batterham, P. J., Calear, A. L., & Han, J. (2016). A systematic review of the predictions of the Interpersonal–Psychological Theory of Suicidal Behavior. *Clinical Psychology Review, 46*, 34-45.
- May, A. M., & Klonsky, E. D. (2016). What Distinguishes Suicide Attempters From Suicide Ideators? A Meta-Analysis of Potential Factors. *Clinical Psychology-Science and Practice, 23*(1), 5-20.
- Nock, M. K., Hwang, I., Sampson, N. A., & Kessler, R. C. (2010). Mental disorders, comorbidity and suicidal behavior: results from the National Comorbidity Survey Replication. *Mol Psychiatry, 15*(8), 868-876. doi: 10.1038/mp.2009.29
- Olatunji, B. O., Davis, M. L., Powers, M. B., & Smits, J. A. (2013). Cognitive-behavioral therapy for obsessive-compulsive disorder: a meta-analysis of treatment outcome and moderators. *J Psychiatr Res, 47*(1), 33-41. doi: 10.1016/j.jpsychires.2012.08.020
- Ribeiro, J. D., Witte, T. K., Van Orden, K. A., Selby, E. A., Gordon, K. H., Bender, T. W., & Joiner, T. E., Jr. (2014). Fearlessness about death: the psychometric properties and construct validity of the revision to the acquired capability for suicide scale. *Psychol Assess, 26*(1), 115-126. doi: 10.1037/a0034858
- Selby, E. A., Anestis, M. D., Bender, T. W., Ribeiro, J. D., Nock, M. K., Rudd, M. D., . . . Joiner, T. E., Jr. (2010). Overcoming the fear of lethal injury: evaluating suicidal behavior in the military through the lens of the Interpersonal-Psychological Theory of Suicide. *Clin Psychol Rev, 30*(3), 298-307. doi: 10.1016/j.cpr.2009.12.004
- Stewart, S. M., Eaddy, M., Horton, S. E., Hughes, J., & Kennard, B. (2017). The validity of the interpersonal theory of suicide in adolescence: A review. *Journal of Clinical Child and Adolescent Psychology, 46*(3), 437-449. doi: 10.1080/15374416.2015.1020542 25864500
- Van Orden, K. A., Cukrowicz, K. C., Witte, T. K., & Joiner, T. E. (2012). Thwarted belongingness and perceived burdensomeness: construct validity and psychometric properties of the Interpersonal Needs Questionnaire. *Psychol Assess, 24*(1), 197-215. doi: 10.1037/a0025358

Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, T. E., Jr. (2010). The interpersonal theory of suicide. *Psychol Rev*, *117*(2), 575-600. doi: 10.1037/a0018697

World Health Organization. (2014). Preventing suicide: a global imperative.

Zbozinek, T. D., Rose, R. D., Wolitzky-Taylor, K. B., Sherbourne, C., Sullivan, G., Stein, M. B., . . . Craske, M. G. (2012). Diagnostic overlap of generalized anxiety disorder and major depressive disorder in a primary care sample. *Depress Anxiety*, *29*(12), 1065-1071. doi: 10.1002/da.22026

**Table 1: Sample characteristics based on presence or absence of suicide attempt (N=1323)**

	No suicide attempt (n=1185)		Suicide attempt (n=138)		$\chi^2$	p
	n	(%)	n	(%)		
<i>Age group</i>					<b>49.3</b>	<b>&lt;0.001</b>
18 - 25 years	296	( 25.0%)	72	( 52.2%)		
26 - 35 years	183	( 15.4%)	20	( 14.5%)		
36 - 45 years	200	( 16.9%)	13	( 9.4%)		
46 - 55 years	251	( 21.2%)	14	( 10.1%)		
56 - 65 years	191	( 16.1%)	13	( 9.4%)		
66 years or older	64	( 5.4%)	5	( 3.6%)		
<i>Gender</i>					<b>6.7</b>	<b>0.035</b>
Male	242	( 20.4%)	28	( 20.3%)		
Female	920	( 77.6%)	104	( 75.4%)		
Other	16	( 1.4%)	6	( 4.3%)		
<i>Educational attainment</i>					<b>28.9</b>	<b>&lt;0.001</b>
Less than high school	81	( 6.8%)	18	( 13.0%)		
Completed high school / equiv	202	( 17.0%)	41	( 29.7%)		
Certificate or diploma	280	( 23.6%)	34	( 24.6%)		
Bachelor Degree	306	( 25.8%)	28	( 20.3%)		
Grad Diploma/ Certificate	133	( 11.2%)	8	( 5.8%)		
Masters Degree or Doctorate	181	( 15.3%)	8	( 5.8%)		
<i>Employment status</i>					<b>22.5</b>	<b>&lt;0.001</b>
Full-time	330	( 27.8%)	17	( 12.3%)		
Part-time/casual	341	( 28.8%)	42	( 30.4%)		
Unemployed	189	( 15.9%)	39	( 28.3%)		
Not working	312	( 26.3%)	38	( 27.5%)		
<i>Location</i>					4.4	0.112
Metropolitan area	610	( 51.5%)	62	( 44.9%)		
Regional area	434	( 36.6%)	63	( 45.7%)		
Rural or remote area	141	( 11.9%)	13	( 9.4%)		
<i>Language spoken at home</i>					1.1	0.564
English only	1102	( 93.0%)	131	( 94.9%)		
English and another language	77	( 6.5%)	7	( 5.1%)		
Another language only	6	( 0.5%)	0	( 0.0%)		
<i>Clinical caseness</i>						
DSM-5 MDD	194	( 16.4%)	30	( 21.7%)	2.5	0.112
DSM-5 GAD	444	( 37.5%)	77	( 55.8%)	<b>17.4</b>	<b>&lt;0.001</b>
DSM-5 SAD	299	( 25.2%)	60	( 43.5%)	<b>20.8</b>	<b>&lt;0.001</b>
DSM-5 PTSD	240	( 20.3%)	54	( 39.1%)	<b>25.5</b>	<b>&lt;0.001</b>
DSM-5 OCD	231	( 19.5%)	53	( 38.4%)	<b>26.2</b>	<b>&lt;0.001</b>
DSM-5 PD	100	( 8.4%)	16	( 11.6%)	1.5	0.215
DSM-5 ADHD	350	( 29.5%)	66	( 47.8%)	<b>19.2</b>	<b>&lt;0.001</b>
DSM-5 AUD	429	( 36.2%)	60	( 43.5%)	2.8	0.094
DSM-5 SUD	165	( 13.9%)	42	( 30.4%)	<b>25.5</b>	<b>&lt;0.001</b>
	M	( SD )	M	( SD )	F	p
Thwarted belongingness	36.0	( 12.4 )	39.4	( 12.6 )	9.2	<b>0.002</b>
Perceived burdensomeness	15.4	( 9.7 )	24.1	( 11.4 )	98.2	<b>&lt;0.001</b>
Capability for suicide	16.7	( 6.9 )	18.6	( 6.6 )	9.6	<b>0.002</b>

Notes: MDD: major depressive disorder, GAD: generalized anxiety disorder, SAD: social anxiety disorder, PTSD: post-traumatic stress disorder, OCD: obsessive-compulsive disorder, PD: panic disorder, ADHD: attention deficit hyperactivity disorder, AUD: alcohol use disorder, SUD: substance use disorder; **bold** values indicate  $p < 0.05$

**Table 2:** Correlation matrix for interpersonal-psychological factors with suicide attempt and psychopathology indicators (N=1323)

	TB	PB	CS
Thwarted belongingness (TB)	<b>1.000</b>		
Perceived burdensomeness (PB)	<b>0.555</b>	<b>1.000</b>	
Capability for suicide (CS)	<b>0.095</b>	<b>0.077</b>	<b>1.000</b>
Suicide attempt	<b>0.083</b>	<b>0.263</b>	<b>0.085</b>
DSM-5 MDD	<b>0.283</b>	<b>0.354</b>	0.042
DSM-5 GAD	<b>0.232</b>	<b>0.327</b>	<b>-0.072</b>
DSM-5 SAD	<b>0.336</b>	<b>0.402</b>	-0.009
DSM-5 PTSD	<b>0.231</b>	<b>0.291</b>	0.036
DSM-5 OCD	<b>0.219</b>	<b>0.323</b>	0.015
DSM-5 PD	<b>0.126</b>	<b>0.151</b>	<b>-0.073</b>
DSM-5 ADHD	<b>0.196</b>	<b>0.279</b>	0.008
DSM-5 AUD	0.039	0.023	0.002
DSM-5 SUD	<b>0.112</b>	<b>0.153</b>	0.060

Note: **bold** values indicate  $p < 0.05$

**Table 3:** Logistic regression Model 1 – interpersonal-psychological main effects

	Estimate	SE	OR	$\chi^2$	p
Thwarted belongingness	-0.029	0.010	<b>0.972</b>	8.471	<b>0.004</b>
Perceived burdensomeness	0.091	0.011	<b>1.095</b>	71.679	<b>&lt;0.001</b>
Capability for suicide	0.037	0.015	<b>1.038</b>	6.426	<b>0.011</b>
<i>Constant</i>	<i>-3.500</i>	<i>0.386</i>	<i>0.030</i>	<i>82.340</i>	<i>&lt;0.001</i>

Note: **bold** values indicate  $p < 0.05$ ;  $-2LL = 788.8$ , Nagelkerke  $R^2 = 0.144$

**Table 4:** Logistic regression Model 2 – interpersonal-psychological main effects and interactions

	Estimate	SE	OR	$\chi^2$	p
Thwarted belongingness (TB)	0.061	0.047	1.063	1.648	0.199
Perceived burdensomeness (PB)	0.098	0.092	1.102	1.114	0.291
Capability for suicide (CS)	0.129	0.085	1.138	2.341	0.126
TB × PB	-0.002	0.002	0.998	0.692	0.405
TB × CS	-0.004	0.002	0.996	3.592	0.058
PB × CS	0.001	0.005	1.001	0.020	0.888
TB × PB × CS	0.000	0.000	1.000	0.488	0.485
<i>Constant</i>	<i>-5.491</i>	<i>1.729</i>	<i>0.004</i>	<i>10.089</i>	<i>0.001</i>

Note: **bold** values indicate  $p < 0.05$ ;  $-2LL = 782.5$ , Nagelkerke  $R^2 = 0.153$

**Table 5:** Logistic regression Model 3 – psychopathology effects

	Estimate	SE	OR	$\chi^2$	p
DSM-5 MDD	-0.266	0.243	0.767	1.196	0.274
DSM-5 GAD	0.354	0.208	1.425	2.893	0.089
DSM-5 SAD	0.405	0.212	1.499	3.664	0.056
DSM-5 PTSD	0.519	0.208	<b>1.680</b>	6.219	<b>0.013</b>
DSM-5 OCD	0.502	0.212	<b>1.653</b>	5.617	<b>0.018</b>
DSM-5 PD	-0.162	0.305	0.850	0.282	0.595
DSM-5 ADHD	0.271	0.206	1.312	1.733	0.188
DSM-5 AUD	0.100	0.194	1.106	0.267	0.605
DSM-5 SUD	0.714	0.220	<b>2.043</b>	10.565	<b>0.001</b>
<i>Constant</i>	<i>-2.973</i>	<i>0.174</i>	<i>0.051</i>	<i>291.967</i>	<i>&lt;0.001</i>

Notes: MDD: major depressive disorder, GAD: generalized anxiety disorder, SAD: social anxiety disorder, PTSD: post-traumatic stress disorder, OCD: obsessive-compulsive disorder, PD: panic disorder, ADHD: attention deficit hyperactivity disorder, AUD: alcohol use disorder, SUD: substance use disorder; **bold** values indicate  $p < 0.05$ ;  $-2LL = 822.9$ , Nagelkerke  $R^2 = 0.094$

**Table 6:** Logistic regression Model 4 – combined effects of IPTS constructs and psychopathology

	Estimate	SE	OR	$\chi^2$	p
DSM-5 MDD	-0.620	0.259	<b>0.538</b>	5.741	<b>0.017</b>
DSM-5 GAD	0.265	0.217	1.304	1.496	0.221
DSM-5 SAD	0.159	0.232	1.173	0.472	0.492
DSM-5 PTSD	0.321	0.219	1.378	2.141	0.143
DSM-5 OCD	0.296	0.223	1.344	1.760	0.185
DSM-5 PD	-0.205	0.317	0.815	0.417	0.518
DSM-5 ADHD	0.203	0.210	1.225	0.931	0.335
DSM-5 AUD	0.174	0.201	1.190	0.748	0.387
DSM-5 SUD	0.646	0.227	<b>1.908</b>	8.065	<b>0.005</b>
Thwarted belongingness	-0.032	0.010	<b>0.968</b>	9.856	<b>0.002</b>
Perceived burdensomeness	0.084	0.012	<b>1.088</b>	49.560	<b>&lt;0.001</b>
Capability for suicide	0.040	0.015	<b>1.041</b>	7.285	<b>0.007</b>
<i>Constant</i>	<i>-3.785</i>	<i>0.411</i>	<i>0.023</i>	<i>84.922</i>	<i>&lt;0.001</i>

*Notes:* MDD: major depressive disorder, GAD: generalized anxiety disorder, SAD: social anxiety disorder, PTSD: post-traumatic stress disorder, OCD: obsessive-compulsive disorder, PD: panic disorder, ADHD: attention deficit hyperactivity disorder, AUD: alcohol use disorder, SUD: substance use disorder; **bold** values indicate  $p < 0.05$ ;  $-2LL = 760.6$ , Nagelkerke  $R^2 = 0.184$

**Table 7:** Logistic regression Model 5 – combined effects of IPTS constructs and psychopathology

	Estimate	SE	OR	$\chi^2$	p
DSM-5 MDD	-0.664	0.263	0.515	6.360	<b>0.012</b>
DSM-5 GAD	0.256	0.218	1.292	1.377	0.241
DSM-5 SAD	0.146	0.235	1.158	0.389	0.533
DSM-5 PTSD	0.322	0.221	1.380	2.118	0.146
DSM-5 OCD	0.288	0.225	1.334	1.641	0.200
DSM-5 PD	-0.151	0.319	0.860	0.224	0.636
DSM-5 ADHD	0.222	0.213	1.249	1.092	0.296
DSM-5 AUD	0.154	0.203	1.166	0.572	0.449
DSM-5 SUD	0.696	0.231	2.005	9.087	<b>0.003</b>
Thwarted belongingness (TB)	0.054	0.049	1.056	1.247	0.264
Perceived burdensomeness (PB)	0.063	0.093	1.065	0.451	0.502
Capability for suicide (CS)	0.122	0.086	1.130	1.997	0.158
TB × PB	-0.001	0.002	0.999	0.402	0.526
TB × CS	-0.005	0.002	0.995	3.612	0.057
PB × CS	0.002	0.005	1.002	0.127	0.722
TB × PB × CS	0.000	0.000	1.000	0.374	0.541
<i>Constant</i>	<i>-5.411</i>	<i>1.761</i>	<i>0.004</i>	<i>9.438</i>	<i>0.002</i>

*Notes:* MDD: major depressive disorder, GAD: generalized anxiety disorder, SAD: social anxiety disorder, PTSD: post-traumatic stress disorder, OCD: obsessive-compulsive disorder, PD: panic disorder, ADHD: attention deficit hyperactivity disorder, AUD: alcohol use disorder, SUD: substance use disorder; **bold** values indicate  $p < 0.05$ ;  $-2LL = 753.2$ , Nagelkerke  $R^2 = 0.194$