

RESEARCH ARTICLE

Generalisability of the interpersonal theory of suicide to latent profiles of young people attending treatment in a suicide prevention service

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Abstract

Objective: The Interpersonal Theory of Suicide (ITS) could help identify differences in groups of suicidal adolescents and inform treatment.

Method: Latent Profile Analysis (LPA) using thwarted belongingness (TB), perceived burdensomeness (PB), hopelessness, and capability was conducted on data from an at-risk clinical sample ($N=500$). The ITS prediction that changes in TB and PB are associated with changes in suicidal ideation was tested using admission and discharge data.

Results: Latent Profile Analysis identified three profiles with increasing complexity and severity on ITS factors. The profiles were labelled *low-severity* (7.6% of participants), *moderate-severity* (45.2%), and *high-severity* (47.2%). ITS predictions were partially supported for the full sample and only for the *high-severity* and *moderate-severity* subgroups, whereby changes in TB were significantly associated with changes in suicidal ideation over the course of treatment. However, changes in PB were only significant in the *moderate-severity* subgroup, and none of the ITS predictions were supported in the *low-severity* subgroup. Additionally, effect sizes for changes in TB and PB were modest in all analyses.

Conclusions: Our findings highlight the importance reducing low belongingness in youth, which is a component of all supported interventions of youth suicide prevention. However, given the modest association of changes in ITS variables had with changes in suicidal ideation, it may be

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fruitful to elaborate on the relative importance on types of low belongingness or include other non-ITS variables.

KEYWORDS

interpersonal theory of suicide, latent profile analysis, self-injury, treatment, youth

INTRODUCTION

Suicide is the number one cause of death in Australian young people aged 12 to 25-years (Australian Bureau of Statistics [ABS], 2022), and globally the fourth leading cause of death for 15 to 29-year-olds (WHO, 2021). From a risk perspective, suicidal ideation is one of the strongest correlates of a suicide attempt history (ABS, 2022; Victor & Klonsky, 2014), and the transition from the onset of suicidal ideation to plan and then to attempt often happens within the first year (Borges et al., 2008; Nock et al., 2008, 2013). A number of other psychosocial factors are commonly associated with suicide, including self-harm, depression, anxiety, stress, substance use, interpersonal problems, and childhood trauma and abuse (ABS, 2022; AIHW, 2021b; Baiden et al., 2017; Lynskey et al., 2006; Millon et al., 2022; Victor & Klonsky, 2014). However, the majority of people who experience these risk factors will not go on to kill themselves (AIHW, 2021a).

The interpersonal theory of suicide (ITS) is an ideation-to-action framework that proposes the underlying mechanisms of suicide (Joiner, 2005; Van Orden et al., 2010). The ITS posits that the interaction of two interpersonal constructs, (1) thwarted belongingness and (2) perceived burdensomeness leads to suicidal desire. Suicidal desire is moderated by feelings of hopelessness about the likelihood of an individual's current situation improving, and is associated with resoluteness to enact a suicide plan. Finally, for someone to enact a lethal suicide attempt, the theory states they must have an acquired capability to do so, potentially developed via painful and provocative experiences (e.g. trauma, self-harm) (Van Orden et al., 2010). While acquired capability is a requisite for suicidal behaviour, according to the ITS, without suicidal desire the relative risk is low. As such, the theory asserts that reductions in thwarted belongingness and perceived burdensomeness should be the aims of psychological interventions (Joiner et al., 2009). Therefore, the ITS may increase understanding of the differences between young people experiencing suicidal ideation, and improve assessment, conceptualisation, and treatment.

Evidence supporting the ITS in clinical populations of suicidal young people is increasing (Hains et al., 2019; Horton et al., 2015; King et al., 2017; Miller et al., 2016), but findings in support of its clinical application are mostly mixed (Chu et al., 2017; Ma et al., 2016; Stewart et al., 2017). Furthermore, although meaningful change over the course of therapy requires sensitivity to an individual's presenting issues (Miller & Rollnick, 2002), a criticism of clinical research has been that the majority of employed methods do not take individual differences into account (Carper et al., 2017). Therefore, utilising more idiographic approaches to test clinical research questions could help improve clinical assessment, conceptualisation, and treatment (Piccirillo et al., 2019). Latent Profile Analysis (LPA) provides an avenue for more idiographic approaches to clinical research. This analytical framework identifies distinct subgroups within a given population that share similar patterns on variables (Berlin et al., 2014; Meyer et al., 2013). With a focus on suicide-related risk (e.g. severity of suicidal ideation, history of trauma, depressive symptoms, self-harm), LPA serves as a powerful tool to categorise individuals into latent profiles, driven by observable data (Berlin et al., 2014). This method enables the organisation of multiple dimensions related to mental health, behavioural patterns, and demographic variables according to the selected latent profile variable (Lanza et al., 2010; Ma et al., 2018; Wong et al., 2020) potentially offering insights into how differences in suicide-related behaviours may be linked to these factors. Similar to cluster analysis in identifying individual clusters based on certain indicators, LPA offers a more robust

framework for understanding subgroups within the population of interest (such as individuals at risk of suicide), as it is model-based and applies stringent criteria for model fit and the number of profiles in a sample (Kelly et al., 2017, 2018; Marsh et al., 2009). Comparisons between these latent subgroups offers the opportunity to reveal factors that are associated with varying responses to therapy and to help clarify active mechanisms of psychological interventions (Kazdin & Nock, 2003). Treatment could then be more effectively tailored for individuals or groups at highest risk (Lanza & Rhoades, 2013; Windgassen et al., 2018). More research adopting individualised methods using the ITS with clinical populations of young people is needed (Chu et al., 2017; Ma et al., 2016; Stewart et al., 2017).

Recent research has used LPA to explore relationships between subclasses of people at risk of suicide within the context of the ITS (Love & Durtschi, 2021; Ma et al., 2018; Wong et al., 2020). For example, Wong et al. (2020) used thwarted belongingness, perceived burdensomeness, and acquired capability to inform the identification of latent classes in a clinical population of adults attending online treatment for suicidal thoughts. With elevated scores on the ITS interpersonal constructs, severity of suicidal ideation, and closeness to recent suicide attempt, in addition to increasing severity on a range of other psychological factors, including hopelessness and depression. The authors suggest that participants with more severe ITS interpersonal factors could benefit from interpersonally oriented treatment components. However, it is unclear whether their findings generalise to adolescents since their participants were adults (Wong et al., 2020). Moreover, the study did not test the association of ITS factors with suicidal ideation (Wong et al., 2020). Ma et al. (2018) tested the association of ITS factors with suicidal ideation across four latent profiles. They found partial support for the association of suicidal ideation with perceived burdensomeness (full sample and class 1), in addition to the interaction between thwarted belongingness and perceived burdensomeness (only class 3). However, this study used a non-clinical adult sample and only tested the posited ITS relationships at a single timepoint (Ma et al., 2018). A longitudinal study partially addressed some of these limitations, in a non-clinical sample of young adults, with data collection beginning during participants' adolescence (Love & Durtschi, 2021). The study found that thwarted belongingness during childhood was associated with an increased risk of suicidal ideation during adulthood (Love & Durtschi, 2021). A major limitation of these findings was that all ITS factors were assessed using proxy measures, with only the thwarted belongingness measure administered during adolescence and the remaining data obtained during adulthood (Love & Durtschi, 2021). An ITS informed approach to identifying latent classes within a clinical population of young people at risk of suicide has not yet been undertaken.

Aims/The present study

The present study aimed to: (1) use ITS variables (thwarted belongingness, perceived burdensomeness, hopelessness, acquired capability) to identify subgroups within young people endorsing suicide ideation at admission to treatment for suicide-related risk (e.g. severity of suicidal ideation, history of trauma, depressive symptoms, self-harm); (2) compare subgroups on baseline levels of ITS and other factors associated with suicide-related risk; and (3) as posited by the ITS, test whether changes in thwarted belongingness and perceived burdensomeness predict changes in suicidal ideation while controlling for the effects of hopelessness and the interaction between variables. To examine these propositions, we follow the approach of Ma et al. (2018) and test the generalisability of the ITS within each group in addition to the full sample. Additionally, given the association between psychological distress factors (e.g. depression, self-harm, trauma) and suicide outlined above, analysing ITS variables alongside psychological distress and psychosocial risk factors may help explain the potential role of the risk pathways and facilitate targeted interventions. As our use of LPA was exploratory (Muthén & Muthén, 2017), there were no specific hypotheses regarding aim (1). There were two hypotheses based on aims (2) and (3) above. We hypothesised that: (1) given the association with psychosocial risk factors and suicide (ABS, 2022; Baiden et al., 2017; Lynskey et al., 2006; Millon et al., 2022; Victor & Klonsky, 2014), groups reporting

higher levels of thwarted belongingness, perceived burdensomeness, hopelessness, and acquired capability will also report the highest levels of mental ill-health (e.g. severity of suicidal ideation, history of trauma, depressive symptoms, self-injury); and (2) changes in thwarted belongingness and perceived burdensomeness will be associated with changes in suicidal ideation over the course of therapy, and this association will be stronger than the effects of changes in hopelessness.

METHOD

Participants and procedure

The research is part of an ongoing service evaluation project approved by the institutional Human Research Ethics Committee (Ethics Number: HE14/376). The data used for this analysis was a naturalistic sample of young people accessing a short-term outpatient suicide prevention program provided by a not-for-profit non-government organisation located in the Illawarra Shoalhaven region of New South Wales, Australia between November 12, 2012 and November 07, 2019. The service offered no-fee psychological support for people aged 12–25 years who were at mild to moderate risk of suicide-related behaviour, including experiencing self-harm and suicidal ideation at the time of referral to the program. In evaluating risk and suitability for services, participants' overall risk levels were assessed using a matrix by mental health intake clinicians or their treating clinician (psychologists or clinical psychologists). This matrix assigned risk as 'low', 'medium', or 'high' based on factors like mental state (e.g. depression, psychosis), history of suicidal attempts, substance misuse, client strengths, available supports, risk level changeability, and clinician's assessment confidence (e.g. conflicting information, poor engagement). For instance, ratings for suicidal ideation were: 'low' (nil or vague thoughts), 'moderate' (frequent thoughts or threats), or 'high' (persistent thoughts, clear intention). The cumulative risk score was derived from the sum of 'low', 'medium', and 'high' ratings. Clients with lower or higher than mild to moderate risk were directed to more suitable services. While there was no set limit to the maximum number of sessions or time period of access to services, participants typically attended 6–8 sessions over 2–3 months. In the current sample, the majority of referrals were from primary care settings such as general practitioners (49%) public mental health services (0.8%) or emergency departments (1.4%). A further 5.2% came from allied health professionals and 6% from other referral sources including self, family and friends. The remainder of participants (37.6%) did not have source of referral information available. Although clinicians were able to draw on different approaches in their clinical work (Janackovski et al., 2021), the main treatment approach was based on a cognitive behavioural therapy framework tailored for suicide prevention (Stanley et al., 2009). All participants provided informed consent to have their clinical information entered into a research database, with parental/carer co-consent sought for participants aged 12–14 years. Not consenting to research participation did not change the treatment offered. Given aim (1) was to test the theory in young people who were experiencing suicidal ideation, we limited our analyses of individual therapy outcomes to participants who reported suicidal ideation at admission. Similarly, given aim (2) was to compare subgroups on symptoms at baseline assessment, analyses were limited to participants' first episode of treatment. To achieve aim (3), participants were only included if they had at least two sessions of data recorded. A session was considered a 'final session' if it was recorded as a 'planned final session' in the research database or if there was no contact for more than 90 days since their last session. Clients who had not attended therapy for 3 months were considered to be completed or dropped out of therapy. This approach has been used in other studies using naturalistic data (e.g. Baldwin et al., 2009; Owen et al., 2015). Unfortunately, we did not have participants' or therapists' ratings of how therapy ended (e.g. dropout, mutual decision, data entry omission). Given the above inclusion criteria, there were 4 clients who declined participation in the study, and 81 who had missing consent (and could not be included). Due to privacy restrictions, no further information is available about these clients. A total of 502 participants provided consent to participate in the study. Two participants were excluded due to missing data (explained further below), providing a final sample of 500 (68.8% females, 28.8% males, 0.4% non-binary, and 2% had missing data on gender). Twenty-four,

participants (4.8%) identified as First Nations Australians. The average age of the sample was 16.80 years ($SD = 3.01$). Females ($M = 16.43$, $SD = 3.01$) were significantly younger than males ($M = 17.53$, $SD = 2.79$), $t[487] = 3.79$, $p < .001$.

Measures

All measures were completed at each session of treatment via self-report unless otherwise specified. As we used change scores in our analysis (discussed further below), we calculated baseline, discharge, and change-score (α^1 , α^2 , and α^{cb} respectively) reliability on the measures used in the regression analyses (Gu et al., 2021). Table 1 describes the measures used in our analyses.

Plan of analysis

Unless otherwise specified, all data preparation, analysis, and plots were carried out using R (version 4, R Core Team, 2021). To achieve aim (1), Latent Profile Analysis (LPA) using Mplus (version 8.6, Muthén & Muthén, 2017) was performed to identify distinct classes based on the four predictors of suicide risk posited by the ITS (thwarted belongingness, perceived burdensomeness, hopelessness, and acquired capability, Joiner, 2005; Van Orden et al., 2010). To identify the best fitting model for the data, the Vuong-Lo-Medell-Rubin Likelihood Ratio test (VLMR, Lo et al., 2001) was compared alongside the Bayesian Information Criterion (BIC) and entropy values. As there was no prior hypothesis on the exact number of profiles, the analysis was conducted starting with a two profile model, increasing the number of profiles until the VLMR became non-significant (Asparouhov & Muthén, 2012). To achieve aim (2) and test hypothesis (1), chi-square and univariate analysis of variance tested differences across classes on the ITS factors, in addition to demographic, psychological distress, treatment related variables, and lifetime prevalence of suicide related factors. Pairwise comparisons were corrected for multiplicity using Bonferroni corrections, where $\alpha_{Bon} = .05/3$. Regarding effect sizes for comparisons, Cohen's d was calculated using the 'compute.es' package (Re, 2013), with SD per class used for continuous measures. Finally, to achieve aim (3) and test hypothesis (2), we first conducted univariate t-tests for the full sample and each subsample on the measures used in the change analysis (suicidal ideation, thwarted belongingness, perceived burdensomeness, hopelessness) using admission and 'final session' data. Then we conducted multivariate linear regression using raw change-scores to test the association between changes in ITS factors and suicidal ideation over the course of therapy. Model diagnostics of initial analysis revealed that the assumptions of normality were not met, therefore we transformed the outcome variable using the rank-based inverse normal method (Bishara & Hittner, 2012).

Missing data were investigated with Little's MCAR test (Little, 1988), which was non-significant, $\chi^2(24940) = 10,903.00$, $p = 1.00$, suggesting the data were missing completely at random. During the data preparation phase, means were prorated for continuous measures that had 20% or less missing items for a scale, otherwise the participant's score on the measure was treated as missing. During the data analysis phase, with the exception of $n = 2$ participants (0.4% of total sample) being excluded by the software due to missing data on all variables used to specify the LPA, missing data was handled either via maximum likelihood estimation or multiple imputation (Muthén & Muthén, 2017; van Buuren, 2021; Yuan & Bentler, 2000). Regarding the use of maximum likelihood and multiple imputation, the latter assumes a single population, however the former challenges this assumption (Colder et al., 2001). Therefore, it has been recommended to first specify a LPA via maximum likelihood, then add the identified classes, in addition to other relevant auxiliary variables, to the imputation model (Collins et al., 2001; Enders & Bandalos, 2001; Graham et al., 2007; Heron & Asparouhov, 2015). Missing data was imputed using the 'mice' package (van Buuren, 2021).

TABLE 1 Measures and variables used in analyses.

| Variable | Description | α^1 | α^2 | α^{cb} |
|------------------------|---|------------------|------------------|------------------|
| TB | Interpersonal Needs Questionnaire (INQ) thwarted belongingness subscale, 9-item, 7-point Likert scale. Higher scores indicate higher severity (Van Orden et al., 2012). | .78 | .89 | .79 |
| PB | INQ perceived burdensomeness subscale, 6-items. All other features as above (Van Orden et al., 2012). | .92 | .96 | .91 |
| BHS | Beck Hopelessness Scale. The service changed from using the original 20 item true/false scale (true = 1 and false = 0, Beck et al., 1974) to the short 4-item version during the data collection period. The latter comprised items 6, 7, 9, and 15 of the original, with a 6-point Likert scale (Alish & Wasserman, 2001; Yip & Cheung, 2006). In order to use data from both versions for analysis, the short-form version had responses rescaled to 0–5, and then summed, providing scores that fell into the same 0–20 range as the full-scale version. | .87 ^a | .93 ^a | .87 ^a |
| BHS | | .75 ^b | .84 ^b | .67 ^b |
| AC | Acquired Capability for Suicide Scale–Fearlessness About Death, 7-items, 5-point Likert scale, measured capability for suicide at baseline. Higher scores indicate greater fearlessness about death (Ribeiro et al., 2014; Van Orden et al., 2008). | .80 | | |
| MSSI | Modified Scale for Suicidal Ideation is a clinician-administered 18-item semi-structured interview used to measure severity of suicidality for the 48 h leading up to the point of interview. Higher scores indicate more severe suicidal ideation. The first four questions are designed as screening items to identify those whose suicidal ideation is severe enough to warrant administration of the entire scale (Miller et al., 1986). Given that data was missing for participants that did not warrant the full administration of the measure but to respect the potential missing data not related to the administration procedure, manual imputation was carried out to be able to compare participants on a uniform scale. The logic used was: if items 5 to 18 were missing and the screening items were below cut-off (i.e. indicated administration should be ceased) and had no items missing, replace missing data on items 5 to 18 with 0, otherwise treat as missing. | .94 ^c | .94 ^c | .93 ^c |
| MSSI | | .74 ^d | .78 ^d | .73 ^d |
| DEP | Depression, Anxiety and Stress Scale—short version (DASS21) depression subscale, measures symptoms of depression over the past week (Lovibond & Lovibond, 1995). Items are rated on a 4-point Likert scale with higher scores indicating higher symptom severity. | .85 | .93 | |
| ANX | DASS21 anxiety subscale. All other features as per above (Lovibond & Lovibond, 1995). | .82 | .90 | |
| STR | DASS21 stress subscale. All other features as per above (Lovibond & Lovibond, 1995). | .79 | .90 | |
| ISAS _{social} | Inventory of Statements about Self-injury (ISAS) interpersonal functions for self-injury subscale (Klonsky & Glenn, 2009; Klonsky & Olin, 2008). Second section of ISAS, 24 items, 3-point Likert scale, eight subordinate functions summed to make up a superordinate interpersonal function. Higher scores indicate stronger endorsement of this function of self-injury. | .90 | | |

TABLE 1 (Continued)

| Variable | Description | α^1 | α^2 | α^b |
|-----------------------|---|------------|------------|------------|
| ISAS _{intra} | ISAS intrapersonal functions for self-injury subscale, 15 items, 5 subordinate functions summed to make up a superordinate intrapersonal function. All other features as per above (Klonsky & Glenn, 2009; Klonsky & Olinio, 2008). | .83 | | |
| Age of onset | Age of onset of deliberate self-injurious behaviours taken from first section of ISAS (Klonsky & Glenn, 2009; Klonsky & Olinio, 2008). | | | |
| Number of methods | Number of lifetime methods of deliberate self-injury endorsed, taken from first section of ISAS (Klonsky & Glenn, 2009; Klonsky & Olinio, 2008). | | | |
| DSH _{Hx} | History of deliberate self-injury prior to current episode of care, part of admission questionnaire. Categorical true/false scale. | | | |
| Trauma _{Hx} | History of personal trauma prior to current episode of care, part of admission questionnaire. Categorical true/false scale. | | | |
| SI _{Hx} | History of suicidal ideation prior to current episode of care, part of admission questionnaire. Categorical true/false scale. | | | |
| SA _{Hx} | History of at least one suicide attempt prior to current episode of care, part of admission questionnaire. Categorical true/false scale. | | | |
| Age | Age at admission, part of admission questionnaire. | | | |
| ATSI | First Nations Australian, part of admission questionnaire. Categorical true/false scale. | | | |
| CALD | Culturally and Linguistically Diverse Australians, part of admission questionnaire. Categorical true/false scale. | | | |
| Sex | Categorical female/male/other scale. "Other" excluded from analysis as the cell size was too small. Part of admission questionnaire. | | | |
| Previous intervention | Psychological treatment prior to current episode of care, part of admission questionnaire. | | | |
| Total Sessions | Number of sessions attended during current episode of care, taken for total sessions recorded in databank. | | | |

Note: α^1 , α^2 , and α^b = baseline, discharge, and change-score reliability respectively (Gu et al., 2021). TB, PB, BHS, and AC baseline measures used in Latent Profile Analysis.

^aBHS 20-item version.

^bBHS 4-item version.

^cMSSI full scale.

^dMSSI screening items.

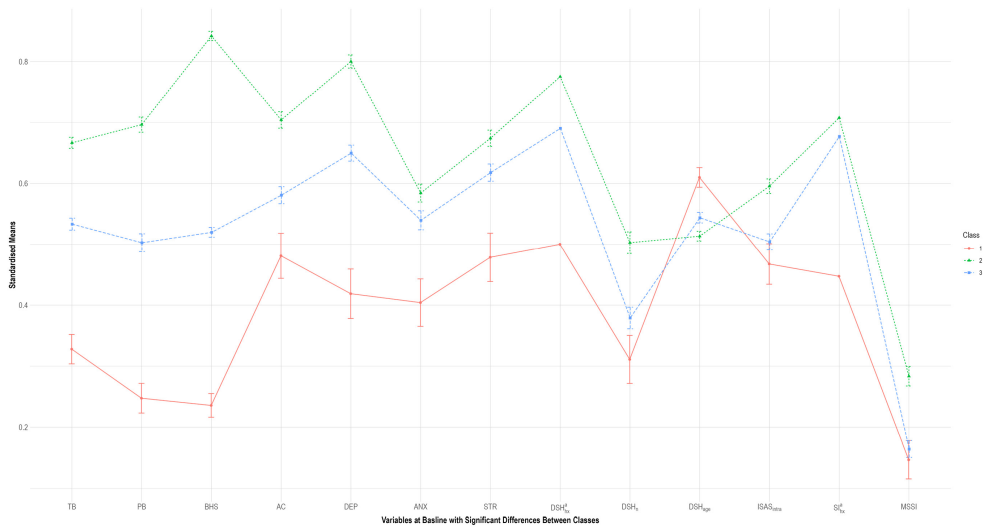


FIGURE 1 Variables measured at baseline with significant differences between classes. *Note:* While the data were modelled in their original scales, given the large differences in scales of measurement the profiles are presented with normalised values for continuously measures and percentage of class that endorsed a variable for categorical measures. ^aCategorical variables, indicating percentage of class that endorsed this factor. AC, Acquired Capability for Suicide Scale—Fearlessness About Death; ANX, DASS21 anxiety subscale; BHS, Beck Hopelessness Scale; DEP, Depression, Anxiety and Stress Scale—short version (DASS21) depression subscale; DSH_H, SI_H, personal histories of deliberate self-injury and suicidal ideation prior to current episode of care; ISAS_{intra}, Inventory of Statements about Self-injury intrapersonal functions for self-injury subscale; MSSI, Modified Scale for Suicidal Ideation; PB, INQ perceived burdensomeness subscale; STR, DASS21 stress subscale; TB, Interpersonal Needs Questionnaire (INQ) thwarted belongingness subscale. Class 1 = Low-Severity ($n = 38$); Class 2 = High-Severity ($n = 236$); Class 3 = Moderate-Severity ($n = 226$).

RESULTS

Latent profile analysis

Aim (1) is covered in this subsection. Fit statistics for models that contained between two and four classes were compared.¹ The findings indicate that, although the loglikelihood reduced with the increase in classes, the three-class solution had an improved fit compared with the preceding model, reflected by the significant VLMR p -value (Nylund et al., 2007). Further, the four-class solution did not yield a significant VLMR p -value at $p < .05$, and was not distinctively different from the three-class solution. Therefore, the three-class model was deemed to provide the most parsimonious solution. Classes are shown in Figure 1, with comparisons plotted for all significant differences discussed further below.

Table 2 shows that between the three classes, the mean scores significantly differed across all ITS domains. The first class had the lowest scores across all four domains. There were 38 (7.6%) individuals in this class, which was termed *low-severity*.² The highest standardised score reported by this class was for the thwarted belongingness indicator. The second class had the largest sample size and the highest scores across all four domains. This class was termed *high-severity* and had 236 (47.2%) individuals. The highest standardised score for this class was for the hopelessness measure. The third class had mid-range domain scores and was termed *moderate-severity*. This class had the second-largest sample size of 226 (45.2%) individuals in this class, and reported higher total scores than the first class, but lower scores than the second class. The highest standardised score reported by this class was the thwarted belongingness indicator.

¹See [Supplementary Material](#) for a table with model fit statistics for the LPA.

²Despite the relatively small sample size number of the *low-severity* class, this class met recommended subsample size for latent profile analysis that is, more than 5% of the overall sample size (Ferguson et al., 2020).

TABLE 2 Latent profile indicators, socio-demographic, risk-, psychological- and treatment-related variables measured at baseline across latent class.

| Variables | Full | | Low-severity (C1) | | High-severity (C2) | | Moderate-severity (C3) | | Chi Sq or F | C2 vs. C1 | | C3 vs. C1 | | C2 vs. C3 | |
|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------|-----------------------------------|-------------------|-----------------------------------|-------------------|-----------------------------------|-------------------|
| | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | | <i>M</i> _{diff} [95% CI] | <i>d</i> [95% CI] | <i>M</i> _{diff} [95% CI] | <i>d</i> [95% CI] | <i>M</i> _{diff} [95% CI] | <i>d</i> [95% CI] |
| Class size ^a [%(<i>n</i>)] | 100.00 (500.00) | 7.60 (38.00) | 47.20 (236.00) | 45.20 (226.00) | | | | | | | | | | | |
| LPA indicator | | | | | | | | | | | | | | | |
| TB | 40.03 (8.64) | 27.39 (7.43) | 44.33 (6.93) | 37.66 (7.37) | 113.76*** | 16.93 [14.34, 19.52] | 2.42 [2.02, 2.82] | 10.26 [7.65, 12.88] | 1.39 [1.03, 1.75] | 6.67 [5.36, 7.98] | 0.93 [0.74, 1.12] | | | | |
| PB | 26.69 (8.69) | 14.91 (5.40) | 31.07 (6.88) | 24.09 (7.93) | 106.81*** | 16.16 [14.19, 18.13] | 2.41 [2.02, 2.81] | 9.19 [7.15, 11.23] | 1.20 [0.85, 1.56] | 6.98 [5.62, 8.34] | 0.94 [0.75, 1.13] | | | | |
| BHS | 13.36 (4.35) | 5.48 (2.27) | 17.00 (2.22) | 10.88 (2.31) | 672.24*** | 11.52 [10.73, 12.32] | 5.18 [4.63, 5.74] | 5.40 [4.60, 6.20] | 2.34 [1.95, 2.74] | 6.13 [5.71, 6.54] | 2.71 [2.46, 2.96] | | | | |
| AC | 17.68 (6.23) | 13.47 (6.39) | 19.72 (5.84) | 16.26 (5.87) | 30.29*** | 6.25 [4.03, 8.47] | 1.06 [0.70, 1.41] | 2.79 [0.56, 5.02] | 0.47 [0.12, 0.82] | 3.46 [2.38, 4.53] | 0.59 [0.40, 0.78] | | | | |
| Demographic | | | | | | | | | | | | | | | |
| Sex (Female) | 70.88 (353.00) | 68.42 (26.00) | 74.04 (174.00) | 68.00 (153.00) | 2.15 | | | | | | | | | | |
| Age | 16.80 (3.01) | 17.11 (3.34) | 16.55 (2.90) | 17.01 (3.05) | 1.58 | | | | | | | | | | |
| ATSI | 4.80 (24.00) | 5.26 (2.00) | 3.39 (8.00) | 6.19 (14.00) | 2.01 | | | | | | | | | | |
| CALD | 7.60 (38.00) | 7.89 (3.00) | 7.20 (17.00) | 7.96 (18.00) | 0.10 | | | | | | | | | | |
| Psychological distress | | | | | | | | | | | | | | | |
| DEP | 15.36 (4.12) | 9.96 (4.76) | 17.21 (3.15) | 14.34 (3.74) | 84.52*** | 7.25 [5.64, 8.86] | 2.12 [1.74, 2.51] | 4.39 [2.75, 6.02] | 1.13 [0.77, 1.48] | 2.86 [2.23, 3.50] | 0.83 [0.64, 1.02] | | | | |
| ANX | 11.56 (4.93) | 8.49 (5.04) | 12.27 (4.73) | 11.33 (4.92) | 10.44*** | 3.78 [2.03, 5.54] | 0.79 [0.44, 1.14] | 2.84 [1.07, 4.61] | 0.58 [0.23, 0.92] | 0.94 [0.06, 1.82] | 0.19 [0.01, 0.38] | | | | |
| STR | 14.04 (4.12) | 11.09 (4.66) | 14.81 (3.88) | 13.74 (4.03) | 15.21*** | 3.71 [2.11, 5.32] | 0.93 [0.58, 1.28] | 2.64 [1.03, 4.26] | 0.64 [0.29, 0.99] | 1.07 [0.35, 1.79] | 0.27 [0.09, 0.45] | | | | |

(Continues)

TABLE 2 (Continued)

| Variables | Low-severity (C1) | | High-severity (C2) | | Moderate-severity (C3) | | Chi Sq or F | C2 vs. C1 | | C3 vs. C1 | | C2 vs. C3 | |
|---------------------------------------|-------------------|---------------|--------------------|----------------|------------------------|--------|-------------|----------------------------|------------|----------------------------|------------|----------------------------|------------|
| | M (SD) | M (SD) | M (SD) | M (SD) | M (SD) | M (SD) | | M _{diff} [95% CI] | d [95% CI] | M _{diff} [95% CI] | d [95% CI] | M _{diff} [95% CI] | d [95% CI] |
| Deliberate self-injury | | | | | | | | | | | | | |
| ISAS _{inter} | 0.74 (0.80) | 0.71 (0.84) | 0.68 (0.66) | 0.82 (0.93) | 1.90 | | | | | | | | |
| ISAS _{intra} | 3.27 (1.18) | 2.81 (1.23) | 3.57 (1.09) | 3.02 (1.18) | 16.63*** | | | | | | | | |
| Number of methods | 4.75 (3.03) | 3.42 (2.67) | 5.53 (2.99) | 4.17 (2.92) | 16.67*** | | | | | | | | |
| Age of onset | 13.69 (2.54) | 15.20 (1.99) | 13.27 (2.47) | 13.87 (2.59) | 10.92*** | | | | | | | | |
| DSH _{fix} [%(<i>n</i>)] | 71.60 (358.00) | 50.00 (19.00) | 77.54 (183.00) | 69.03 (156.00) | 13.55** | | | | | | | | |
| Suicide-related | | | | | | | | | | | | | |
| MSSI | 10.20 (9.71) | 7.15 (8.09) | 12.91 (10.31) | 7.89 (8.53) | 18.64*** | | | | | | | | |
| SA _{fix} [%(<i>n</i>)] | 36.20 (181.00) | 26.32 (10.00) | 39.41 (93.00) | 34.51 (78.00) | 2.94 | | | | | | | | |
| SI _{fix} [%(<i>n</i>)] | 67.40 (337.00) | 44.74 (17.00) | 70.76 (167.00) | 67.70 (153.00) | 10.11** | | | | | | | | |
| Trauma _{fix} [%(<i>n</i>)] | 43.80 (219.00) | 34.21 (13.00) | 45.34 (107.00) | 43.81 (99.00) | 1.65 | | | | | | | | |

TABLE 2 (Continued)

| Variables | Full | Low-severity (C1) | High-severity (C2) | Moderate-severity (C3) | Chi Sq or F | C2 vs. C1 | | C3 vs. C1 | | C2 vs. C3 | |
|---------------------------------------|----------------|-------------------|--------------------|------------------------|-------------|----------------------------|------------|----------------------------|------------|----------------------------|------------|
| | M (SD) | M (SD) | M (SD) | M (SD) | | M _{diff} [95% CI] | d [95% CI] | M _{diff} [95% CI] | d [95% CI] | M _{diff} [95% CI] | d [95% CI] |
| Treatment-related | | | | | | | | | | | |
| Previous intervention [%(<i>n</i>)] | 57.80 (289.00) | 63.16 (24.00) | 59.32 (140.00) | 55.31 (125.00) | 1.25 | | | | | | |
| Total sessions | 5.35 (2.20) | 5.16 (2.46) | 5.49 (2.22) | 5.23 (2.14) | 0.94 | | | | | | |

Note: Bold indicates significant contrast at Bonferroni corrected level. Gender “other” excluded from analysis as the cell size was too small.

Abbreviations: AC, Acquired Capability for Suicide Scale—Fearlessness About Death; ANX, DASS21 anxiety subscale; ATSI, First Nations Australian; BHS, Beck Hopelessness Scale; CALD, Culturally and Linguistically Diverse Australians; DEP, Depression, Anxiety and Stress Scale—short version (DASS21) depression subscale; DSH_{11k}, SA_{11k}, SI_{11k}, Trauma_{11k}, personal histories of deliberate self-injury, suicide attempt, suicidal ideation, and trauma, respectively, prior to current episode of care; ISAS_{inter}, Inventory of Statements about Self-injury (ISAS) interpersonal functions for self-injury subscale; ISAS_{intra}, ISAS intrapersonal functions for self-injury subscale; LPA, Latent Profile Analysis; M_{diff}, mean difference for continuous variables; MSSI, Modified Scale for Suicidal Ideation; PB, Interpersonal Needs Questionnaire (INQ) perceived burdensomeness subscale; Previous intervention, any psychological treatment prior to current episode of care; STR, DASS21 stress subscale; TB, INQ thwarted belongingness subscale.

^aClass size percentages are proportions of the full sample and all other percentages are subsample proportions per class.

^bOdds Ratio for categorical variables.

^c*p* < .001; ^d*p* < .01.

Comparisons between latent profiles

Aim (2) and hypothesis (1) are addressed in this subsection and all effect sizes for comparisons are provided in Table 2. For brevity, the description of results in this section focuses predominantly on “large” effect sizes between classes of $d \geq .80$ (Cohen, 1988).

With regard to both perceived burdensomeness and thwarted belongingness, compared to the *low-severity* class, *high-severity* had means more than two standard deviations larger and *moderate-severity* more than one standard deviation higher. Likewise, the *high-severity* means were almost one standard deviation larger than *moderate-severity*. Regarding hopelessness, *high-severity* had a mean more than five standard deviations larger than *low-severity* and more than two standard deviations larger than *moderate-severity*. The *moderate-severity* mean was more than two standard deviations higher than *low-severity*. Regarding acquired capability, *high-severity* had a mean more than one standard deviation larger than *low-severity*.

In terms of psychological distress, symptoms of depression were more than two standard deviations larger for the *high-severity* compared to *low-severity*, and approaching one standard deviation larger compared to *moderate-severity*. *Moderate-severity* reported symptoms of depression more than one standard deviation higher than the *low-severity* class. There were no significant differences between the *high-* and *moderate-severity* classes in terms of anxiety severity, and medium effect size differences between both *high-* and *moderate-severity* compared to the *low-severity* class. However, for stress, the *high-severity* class had an almost one standard deviation difference higher score compared to the *low-severity* class, and a large effect size.

In terms of self-harm, *high-severity* was 3.46 times more likely than *low-severity* to report a history of self-harm prior to the current treatment episode (77.54% compared to 50.00%, respectively), with this comparison showing a small to medium effect. Regarding age of onset of self-harm, compared to *low-severity*, *high-severity* was approaching one standard deviation younger ($d = -0.80$, $p < .001$). Moreover, *high-severity* endorsed significantly more methods of self-harm and self-harm for intrapersonal reasons than both the *low-severity* ($d = 0.72$ [methods], 0.69 [intrapersonal reasons], both $p < .001$), and the *moderate-severity* classes ($d = 0.46$ [methods], 0.48 [intrapersonal reasons], both $p < .001$), with medium and small effect sizes for the respective comparisons between classes. There were no significant differences between *low-* and *moderate-severity* on number of methods of self-harm endorsed, the endorsement of intrapersonal functions of self-harm, nor were there any significant differences between any of the classes on interpersonal functions.

Regarding suicide related variables, *high-severity* were 2.99 times more likely than *low-severity* to report a history of suicidal ideation prior to their current treatment episode (70.76% compared to 44.74%, respectively). Likewise, *moderate-severity* were 2.59 times more likely than *low-severity* to report a history of suicidal ideation (67.70% compared to 44.74%, respectively). Although effect sizes for these comparisons was small. Suicidal ideation was significantly more severe in the *high-severity* class, with about half a standard deviation larger scores than both *low-* and *moderate-severity* classes. There were no significant differences between classes in previous history of trauma or suicide attempts.

There were no significant differences between classes on the demographic variables of age, gender, or cultural background. Likewise, there were no differences between classes on treatment related variables, such as whether participants had engaged in psychological therapy prior to engaging with the service, or the number of sessions attended in their current episode of care.

Change over the course of therapy

Aim (3) and hypothesis (2) are addressed in this subsection. Results for the univariate t -tests analysing change over the course of therapy for the full sample and each class are displayed in Table 3. For the full sample, change between admission and discharge was significant for all variables used in the multivariate linear regression with suicidal ideation having a large effect, and thwarted belongingness, perceived burdensomeness, and hopelessness having medium effects respectively. For *low-severity*, only changes in suicidal ideation were significant, with a large effect. Whereas for *high-severity*, change was significant for

all variables, with suicidal ideation, hopelessness, and perceived burdensomeness showing large effects, and thwarted belongingness with a medium effect. *Moderate-severity* also had significant change for all variables, with suicidal ideation large effect, and thwarted belongingness, perceived burdensomeness, and hopelessness each showing medium effects.

Results of the multivariate linear regressions are displayed in Table 4. For the full sample, only changes in symptoms of thwarted belongingness were significantly associated with changes in suicidal ideation ($p < .05$). The explained variance for this model was $F(7, 492) = 6.47, p < .001, R^2 = .08, R^2_{\text{Adjusted}} = .07$. Subanalyses per subsample showed for *low-severity*, the interaction effect of changes in thwarted belongingness and hopelessness were significant ($p < .05$). However, this model was non-significant, $F(7, 30) = 0.94, p = .488$. For *high-severity*, the main effects of changes in thwarted belongingness were significant ($p < .05$). The explained variance for this model was small $F(7, 228) = 2.96, p < .01, R^2 = .08, R^2_{\text{Adjusted}} = .06$. Whereas for *moderate-severity*, the main effects of changes in thwarted belongingness and perceived burdensomeness were significant ($p < .05$ respectively). The explained variance for this model was $F(7, 218) = 4.74, p < .001, R^2 = .13, R^2_{\text{Adjusted}} = .10$.

DISCUSSION

Main findings

The current study explored distinct patterns of suicide-related behaviours (e.g. severity of suicidal ideation, history of trauma, depressive symptoms, self-harm) amongst young people engaging in outpatient psychological interventions for suicide prevention. Our aims were to: (1) identify subgroups of young people who endorsed suicide ideation at the time of admission to treatment based on ITS variables (thwarted belongingness, perceived burdensomeness, hopelessness, acquired capability); (2) compare subgroups on baseline levels of ITS variables and other factors associated with suicide-related risk; and (3) test the theory's predictions that changes in thwarted belongingness and perceived burdensomeness predicted changes in suicidal ideation. The results from the LPA revealed three distinct classes: *low-severity*, *high-severity*, and *moderate-severity*. The groups differed significantly on all ITS factors measured at treatment commencement: thwarted belongingness, perceived burdensomeness, hopelessness, and acquired capability (Van Orden et al., 2010). The number of subgroups in our findings are consistent with recent investigations into latent profiles of suicidal individuals that tend to find three groups varying on factors associated with suicide (Bertuccio et al., 2021; Love & Durtschi, 2021; Weintraub et al., 2020; Wong & Maffini, 2011; Wong et al., 2020; Xiao & Lindsey, 2021). The identification of meaningful differences between these groups provides support to dimensional approaches of conceptualising psychopathology (Kotov et al., 2017; Ruggero et al., 2019) and suicidal behaviours (e.g. self-harm, suicidal thoughts, planning, attempts, Rudd, 2006; Vrouva et al., 2010), and reiterates the importance of flexibility in assessment and intervention (Hofmann & Hayes, 2019; Pisani et al., 2016).

Regarding our second aim, our hypothesis that groups reporting higher levels of thwarted belongingness, perceived burdensomeness, hopelessness, and acquired capability would also report the highest levels of mental ill-health symptoms (e.g. suicidal ideation, depression, self-harm), was largely supported. For example, there were differences in self-harm and acquired capability between the profiles. The *high-severity* group reported more methods and younger age of onset than both the other classes, in addition to more strongly endorsing intrapersonal functions for their use of self-harm. In addition to the differences in ITS variables, classes significantly differed on severity of psychological distress, which is consistent with the association of psychosocial and suicide-related risk (ABS, 2022; Baiden et al., 2017; Lynskey et al., 2006; Millon et al., 2022; Victor & Klonsky, 2014). However, the lack of significant differences in terms of number of suicide attempts and baseline suicidal ideation between profiles was unexpected. Regarding suicide attempts, one explanation for this could be related to the relatively young age of participants, and that the sample were considered mild- to moderate suicide risk. In terms of suicidal ideation, the *high-severity* class reported significantly larger scores than both the other

TABLE 3 T-tests of pre- and post-changes for the full sample, and each class individually.

| | Full sample (N=500) | | | | Low-severity (C1, n=38) | | | |
|------------------|---------------------|--------------------|-------------------------------|-------------------------|-------------------------|------------------|-------------------------------|--------------------------|
| | M (SD) | t (df) | M _{diff} [95% CI] | d [95% CI] | M (SD) | t (df) | M _{diff} [95% CI] | d [95% CI] |
| SI ₁ | 10.20 (9.71) | -17.20 (499)*** | -7.47 [-8.46, -6.49] | 0.94 [0.81, 1.07] | 7.15 (8.09) | -3.88 (74)*** | -5.47 [-8.30, -2.63] | 0.89 [0.42, 1.36] |
| SI ₂ | 2.73 (5.69) | | | | 1.69 (3.19) | | | |
| PB ₁ | 26.69 (8.69) | -15.53 (499)*** | -6.42 [-7.58, -5.27] | 0.69 [0.56, 0.82] | 14.91 (5.40) | -1.44 (74) | -2.01 [-4.81, 0.78] | 0.33 [-0.12, 0.78] |
| PB ₂ | 20.26 (9.87) | | | | 12.89 (6.75) | | | |
| TB ₁ | 40.03 (8.64) | -12.73 (499)*** | -5.71 [-6.95, -4.48] | 0.57 [0.45, 0.70] | 27.39 (7.43) | -1.26 (74) | -2.66 [-6.88, 1.57] | 0.29 [-0.16, 0.74] |
| TB ₂ | 34.31 (11.09) | | | | 24.74 (10.72) | | | |
| BHS ₁ | 13.36 (4.35) | -16.00 (499)*** | -3.60 [-4.22, -2.98] | 0.72 [0.59, 0.85] | 5.48 (2.27) | -0.89 (74) | -0.64 [-2.07, 0.79] | 0.20 [-0.25, 0.66] |
| BHS ₂ | 9.75 (5.57) | | | | 4.84 (3.78) | | | |

Note: Variable subscript_n = measurement occasion, where “1” is admission and “2” is discharge.

Abbreviations: BHS, Hopelessness; M_{diff}, mean difference for continuous variables; n_{obs}, Number of participants with observed data on relevant variable; PB, Perceived Burdensomeness; SI, Suicidal Ideation; TB, Thwarted Belongingness.

***p < .001.

classes, which is consistent with the predictions of the ITS. Yet, while the *moderate-severity* class reported significantly higher severity on ITS variables compared to *low-severity* class, there were no significant differences between these profiles in terms of severity of suicidal ideation. Although this result could be due to a sample size limitation, it is in contrast to the propositions of the ITS (Van Orden et al., 2010). One of the implications of these findings is that although the ITS factors do seem to be associated with other risk factors related to suicide, there may be additional risk or protective factors moderating the severity of suicidal ideation not accounted for in the current study and also missing from the ITS. For example, May et al. (2016) found that psychache and escape were highly endorsed as reasons for a prior suicide attempt by adolescent suicide attempters. Both variables have a more intrapersonal focus and feature as risk factors in other ideation-to-action theories of suicide (Klonsky & May, 2015; O'Connor & Kirtley, 2018). In terms of protective factors, studies have found that family connectedness is a stronger predictor of suicide related behaviours compared to connectedness to peers, school, or adults at school (Kaminski et al., 2010; Opperman et al., 2015). Furthermore, Grimmond et al. (2019) highlighted the importance of the family relationships in supporting recovery and reducing risk for suicide. The inclusion of these factors in future refinements of the ITS could improve the theory's predictive capacity.

The third aim and associated hypothesis were partially supported. It was hypothesised that changes in thwarted belongingness and perceived burdensomeness (and the two way-interaction) would be associated with changes in suicidal ideation over the course of therapy. Further, these effects would be greater than the effects of changes in hopelessness and its moderating effect on thwarted belongingness and perceived burdensomeness. For the full sample, the main effects of changes in thwarted belongingness were significantly associated with changes in suicidal ideation over the course of therapy. Subanalyses per class revealed differing results. For *low-severity*, univariate results indicate they did not report any significant changes in the

| High-severity (C2, <i>n</i> =236) | | | | Moderate-severity (C3, <i>n</i> =226) | | | |
|-----------------------------------|------------------------|-----------------------------------|----------------------|---------------------------------------|------------------------|-----------------------------------|----------------------|
| <i>M</i> (<i>SD</i>) | <i>t</i> (<i>df</i>) | <i>M</i> _{diff} [95% CI] | <i>d</i> [95% CI] | <i>M</i> (<i>SD</i>) | <i>t</i> (<i>df</i>) | <i>M</i> _{diff} [95% CI] | <i>d</i> [95% CI] |
| 12.91 (10.31) | -11.93 (470)*** | -9.48 [-11.04, -7.91] | 1.10 [0.90, 1.29] | 7.89 (8.53) | -8.72 (450)*** | -5.72 [-7.01, -4.43] | 0.82 [0.63, 1.01] |
| 3.43 (6.54) | | | | 2.17 (4.94) | -8.72 (450)*** | | |
| 31.07 (6.88) | -9.28 (470)*** | -7.36 [-8.92, -5.80] | 0.85 [0.67, 1.04] | 24.09 (7.93) | -7.91 (450)*** | -6.19 [-7.73, -4.65] | 0.74 [0.55, 0.93] |
| 23.71 (10.06) | | | | 17.90 (8.69) | -7.91 (450)*** | | |
| 44.33 (6.93) | -7.80 (470)*** | -6.70 [-8.39, -5.01] | 0.72 [0.53, 0.90] | 37.66 (7.37) | -6.46 (450)*** | -5.19 [-6.77, -3.61] | 0.61 [0.42, 0.80] |
| 37.62 (11.24) | | | | 32.47 (9.58) | -6.46 (450)*** | | |
| 17.00 (2.22) | -12.33 (470)*** | -5.00 [-5.80, -4.20] | 1.13 [0.94, 1.33] | 10.88 (2.31) | -7.97 (450)*** | -2.64 [-3.29, -1.99] | 0.75 [0.56, 0.94] |
| 12.00 (5.83) | | | | 8.24 (4.41) | -7.97 (450)*** | | |

ITS factors, although a significant reduction in suicidal ideation was found. The regression model for this group was non-significant. For *high-* and *moderate-severity*, univariate results indicate they reported significant changes in the ITS factors and reductions in suicidal ideation. However, only changes in thwarted belongingness were significantly associated with changes in suicidal ideation for the *high-severity* class, whereas for the *moderate-severity* class, changes in thwarted belongingness and perceived burdensomeness were both significantly associated with changes in suicidal ideation. No significant interaction effects were found. While our results are generally inconsistent with the majority of cross-sectional and longitudinal research on the ITS (Abbott et al., 2021; Ma et al., 2016; Wu et al., 2020; Zhang et al., 2021), which has found perceived burdensomeness to be the most commonly associated ITS factor with suicidal ideation, some research does suggest that thwarted belongingness may be a more important factor in youth at risk of suicide (Czyz et al., 2019; Love & Durtschi, 2021; Thullen et al., 2016; Wong & Maffini, 2011). On the other hand, despite the generally large effect sizes for changes in univariate variables for the full sample, and *high-* and *moderate-severity* groups, the overall explained variance for the regression models were small. This indicates that a substantial amount of the variability in changes to suicidal ideation remains unexplained and may suggest that while the ITS variables, and in particular thwarted belongingness, would be important to consider within a treatment context, it is also important to consider additional risk and protective factors in treatment, as discussed above.

Implications

The ITS may be useful in informing assessment and treatment planning, in so far as assessing general severity of ITS symptoms may provide a quick overview of young people who potentially have

TABLE 4 Multivariate regression models testing the associations of changes in interpersonal-psychological theory constructs with changes in suicidal ideation.

| | Full sample (N=500) | | | | Low-severity (C1, n=38) | | | | High-severity (C2, n=236) | | | | Moderate-severity (C3, n=226) | | | |
|-----------|---------------------|------|-------|----------------|-------------------------|------|-------|----------------|---------------------------|------|-------|---------------|-------------------------------|------|-------|----------------|
| | B | SE | t | 95% CI | B | SE | t | 95% CI | B | SE | t | 95% CI | B | SE | t | 95% CI |
| Intercept | -0.18** | 0.06 | -3.12 | [-0.29, -0.07] | -0.10 | 0.16 | -0.62 | [-0.42, 0.22] | 0.05 | 0.10 | 0.54 | [-0.14, 0.24] | -0.43*** | 0.08 | -5.18 | [-0.59, -0.26] |
| PB | 0.01 | 0.01 | 1.27 | [-0.01, 0.03] | -0.01 | 0.02 | -0.30 | [-0.06, 0.04] | -0.01 | 0.02 | -0.72 | [-0.04, 0.02] | 0.03** | 0.01 | 3.01 | [0.01, 0.05] |
| TB | 0.02** | 0.01 | 2.92 | [0.01, 0.04] | 0.02 | 0.03 | 0.72 | [-0.04, 0.08] | 0.03* | 0.01 | 2.34 | [0.00, 0.05] | 0.02* | 0.01 | 2.06 | [0.00, 0.04] |
| BHS | 0.01 | 0.02 | 0.41 | [-0.03, 0.04] | -0.06 | 0.06 | -0.97 | [-0.18, 0.06] | -0.02 | 0.03 | -0.81 | [-0.08, 0.03] | 0.02 | 0.02 | 0.75 | [-0.03, 0.06] |
| PB×TB | -0.00 | 0.00 | -0.61 | [-0.00, 0.00] | -0.00 | 0.00 | -0.17 | [-0.01, 0.01] | 0.00 | 0.00 | 0.27 | [-0.00, 0.00] | 0.00 | 0.00 | 0.80 | [-0.00, 0.00] |
| PB×BHS | 0.00 | 0.00 | 0.77 | [-0.00, 0.00] | 0.02 | 0.01 | 1.77 | [-0.00, 0.05] | 0.00 | 0.00 | 1.76 | [-0.00, 0.01] | -0.00 | 0.00 | -0.31 | [-0.01, 0.00] |
| TB×BHS | -0.00 | 0.00 | -1.79 | [-0.00, 0.00] | -0.02* | 0.01 | -2.31 | [-0.03, -0.00] | -0.00 | 0.00 | -1.12 | [-0.01, 0.00] | 0.00 | 0.00 | 0.29 | [-0.00, 0.01] |
| PB×TB×BHS | 0.00 | 0.00 | 1.20 | [-0.00, 0.00] | 0.00 | 0.00 | 0.38 | [-0.00, 0.00] | -0.00 | 0.00 | -0.12 | [-0.00, 0.00] | -0.00 | 0.00 | -1.80 | [-0.00, 0.00] |

N=66; PB, TB, BHS, and AC modelled as standardised scores. Gender "other" excluded from analysis due to small number of observations. Standardised coefficients presented in table. For ease of reading, significant values are in bold.

Abbreviations: AC, Acquired Capability, measured only at admission; BHS, Hopelessness; DEP, Depression; PB, Perceived Burdensomeness; TB, Thwarted Belongingness; Total sessions, total number of sessions for episode of care.

*** $p < .001$; ** $p < .01$; * $p < .05$.

more severe symptoms associated with risk for suicide, for example, depression, self-harm, suicidal ideation. The LPA in the present study identified three profiles that generally differed on severity of these symptoms. However, except for the different overall levels of severity, we could not identify any distinctive patterns that might add any meaningful insights into assessment or treatment refinement compared to what might be considered current clinical care approaches. In short, most suicide prevention programs consider overall severity of historical, current, and dynamic risk factors. Moreover, given the small amount of variation explained by changes in thwarted belongingness and the inability of ITS variables to predict suicidal ideation in the *low-severity* class, our results indicate that consideration of variables beyond the ITS in assessment and intervention may be prudent. For example, this seems to be consistent with findings of psychache or escape as potentially more important risk factors associated with suicide attempt in at risk youth (Klonsky & May, 2015; May et al., 2016; O'Connor & Kirtley, 2018). Likewise, assessment of types and quality of belonging could also identify those at higher risk, in addition to improving interventions, and is consistent with recent findings on efficacious psychosocial interventions for youth at risk of suicide. These findings suggest involving parents or carers is important and can have a positive influence on clinical outcomes for young people, although additional treatment strategies will likely be required (Glenn et al., 2019; Pineda & Dadds, 2013). Furthermore, given the quality of young people's relationships with parents or carers could be a relatively more important factor to consider in youth suicide prevention (Barzilay et al., 2019; Wong & Maffini, 2011), and may act as a protective mechanism against factors such as psychache or escape, the ITS may be improved by elaborating on the types of thwarted belongingness that may be most important for youth, for example, parents, peers (Barzilay et al., 2019).

Limitations and future directions

There were several limitations to the study. Firstly, the suicide prevention program from which the naturalistic sample of participants were drawn is for young people with suicide risk deemed to be mild-to-moderate in severity. Therefore, our findings may not generalise to other settings or levels of severity where suicidal ideation or attempts are higher (e.g. psychiatric inpatient settings). Moreover, analyses used admission and discharge data. No follow-up information was available on the maintenance of treatment outcomes or the number of suicide deaths in the current sample. While no differences between profiles were found on suicide attempt status, no information on the lethality of prior attempts or whether and how it was discovered was available. Although *low-severity* met the recommended retention criteria (Ferguson et al., 2020), they were a relatively small subsample, and comparisons between classes may have been attenuated by subsample size. Additionally, the variables used to compare individuals were limited to factors associated with risk (e.g. depression, history of suicidal ideation and self-harm), but there was a lack of detail in other known areas of risk (e.g. externalising behaviours, Bertuccio et al., 2021; Podlogar et al., 2021) and protective factors (e.g. family cohesion or involvement in therapy, Baiden et al., 2017; Love & Durtschi, 2021; Pisani et al., 2016; Wong et al., 2020). Likewise, since the varying severity and constellation of these factors may be indicative of other underlying psychopathology (Boyda et al., 2020; Case et al., 2020; Klonsky, 2007; Nock, 2008; Podlogar et al., 2021; for example, personality disorder, bipolar disorder, psychosis, Weintraub et al., 2020), this dataset was not able to adequately determine any psychiatric conditions that could influence the allocation of individuals to profiles. In other words, there may be additional factors that could be moderating the severity of suicide risk not measured here. Further research should seek to address this by including variables that capture the nature, recency, and chronicity of risk and availability of additional protective factors. Future studies should also seek to understand how the ITS (Van Orden et al., 2010) and other distress or protective factors vary over the course of therapy. To this end, an information theoretic approach (Burnham et al., 2002) could be used to determine what factors may better account for changes in suicidal ideation. This approach examines

a set of candidate models based on theory and determines for each one the probability that it is more reflective of the relationships within the data than all others in the set (Newland, 2019). Finally, investigating the response to different treatment approaches for people with varying profiles may provide more evidence for the utility of the classes as identified in this study.

Conclusion

This study is the first to use ITS constructs to identify subgroups of young people at risk of suicide engaged in psychological intervention specific to suicide prevention. Our findings partially support the central tenets of the ITS and highlight the importance of addressing thwarted belongingness in interventions for youth suicide prevention. However, given the modest association changes in thwarted belongingness had with changes in suicidal ideation, it may be fruitful to elaborate on the relative importance on types of thwarted belongingness or include other non-ITS variables. What is more, although severity of ITS symptoms seems to be associated with individual severity across a range of risk factors for suicide, our findings highlight the need for individualised treatment and assessment, and the importance of identifying other contributing suicide risk and protective factors.

AUTHOR CONTRIBUTIONS

Atanas Janackovski: Conceptualization; formal analysis; methodology; writing – original draft; writing – review and editing. **Frank P. Deane:** Conceptualization; methodology; supervision; writing – review and editing. **Alex Hains:** Conceptualization; supervision; writing – review and editing. **Peter J. Kelly:** Supervision; writing – review and editing. **Laura D. Robinson:** Conceptualization; methodology; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

Atanas Janackovski commenced a paid employment position for the organisation where data were collected after the data collection period outlined in the study, however, has since left the organisation.

DATA AVAILABILITY STATEMENT


All code used to reproduce this research is available at https://github.com/atanasj/lpa_public. Please note, due to privacy restrictions related to the University of Wollongong Human Research Ethics Committee (Ethics Number: HE14/376) approval for this study, no data is available. However, if you wish to access the data used in this study, an application can be made to the data custodian **Grand Pacific Health**.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Tables S1–S2.

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