Psychometric properties of the Italian version of the Interpersonal Needs Questionnaire-15 (INQ-15-I)

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Abstract

Objective: The Interpersonal Needs Questionnaire (INQ-15) is a self-report measure of thwarted belongingness and perceived burdensomeness, two constructs associated to suicidal ideation. The objective of the current study was to translate the INQ-15 from English to Italian (INQ-15-I) and to test its factor structure, reliability, and validity in Italian samples. **Method:** We examined (a) whether the components of the hypothesized two-factor measurement model are invariant across a community sample (N = 510) and a clinical sample (N = 259); (b) the relations between the INQ-15-I factors and measures of depression (Beck Depression Inventory-II), hopelessness (Beck Hopelessness Scale), and suicidal ideation (Beck Scale for Suicide Ideation); (c) the reliability and psychometric properties of the INQ-15-I. **Results:** Results from multi-group confirmatory factor analyses supported the adequacy of the two-factor model to represent thwarted belongingness and perceived burdensomeness. The model is invariant across community and clinical groups, showing excellent fit. The two INQ-15-I scales measure highly intercorrelated constructs. Both significantly correlate with depression, hopelessness and suicidal ideation, and correlations are high in the clinical sample. **Conclusion:** The INQ-15-I is a valid and reliable measure of thwarted belongingness and perceived burdensomeness. Implications for research, assessment, and intervention in suicidal ideation are discussed.

Keywords: Interpersonal Needs Questionnaire; Suicidal ideation; Italian; INQ-15; Interpersonal Theory of Suicide.

Introduction

Over 800,000 people worldwide die from suicide every year (World Health Organization, 2014). In 2012, suicide accounted for the 1.4% of the global death toll. Among young people aged 15-29 years, suicide is the second major cause of death (World Health Organization, 2014). In Italy, suicide is the third leading cause of death in the adult population, with rates increasing with age: 6.1/100,000 inhabitants in those aged 25-44 years, 8.4/100,000 in those aged 45-64 years, and 11.3/100,000 in those aged 65 and over (Italian National Institute of Statistics [ISTAT], 2011).

Suicide is a complex, multi-factorial act, generating and developing over time through a variety of life experiences (Lotito & Cook, 2016). In particular, it is defined as "death caused by self-directed injurious behavior with an intent to die as a result" (Klonsky, May, & Saffer, 2016, p. 309). Suicide entails a number of proximal risk factors such as psychopathology, especially major depressive disorder and substance disorders, and distal risk factors such as gender, family history of suicide, and personality (Turecki, Ernst, Jollant, Labonte, & Mechawar, 2012).

Thinking about, considering, or planning suicide define suicidal ideation, a major predictor of suicidal attempt and behavior (Beck, 1976; Klonsky et al., 2016). Suicidal ideation, planning, and attempts show an estimated cross-national lifetime prevalence (standard error) of 9.2% (0.1), 3.1% (0.1), and 2.7% (0.1), respectively (Nock et al., 2008). Suicidal ideation dramatically challenges individuals' health and safety, prompting negative consequences such as injury, hospitalization, financial problems and loss of liberty, ultimately exerting a significant strain on communities and health care systems (World Health Organization, 2014; as cited in Klonksy et al., 2016). Therefore, improving the

understanding and the measurement of suicidal ideation is of foremost importance for predicting and preventing suicidal behavior (Maung, 2020).

Recently, research has focused on the interplay between intra-individual dynamic systems and the way individuals relate to their environment to explain suicidal ideation and behaviour (Franklin, et al., 2017; Prinstein, 2008). In this regard, the Interpersonal Theory of Suicide (Joiner, 2005; Van Orden, Witte, Cukrowicz, Braithwaite, Selby, & Joiner, 2010) represents an empirically supported framework that sees an increasing attention in the literature (see Chu et al., 2017), postulating the simultaneous presence of two interpersonal correlates of suicidal ideation, namely thwarted belongingness and perceived burdensomeness. According to Van Orden et al. (2012), thwarted belongingness and perceived burdensomeness are the most proximal mental states to the development of suicidal thoughts, whereas the theory considers stressful life events, mental disorders, and other known suicide risk factors as distal factors.

Specifically, according to the Interpersonal Theory of Suicide, when one's primary need for social connectedness (i.e. the "need to belong") is unmet, the resulting, psychologically painful mental state is a sense of "thwarted" (or low) belongingness. Thwarted belongingness is further defined by two dimensions of interpersonal functioning: Loneliness and absence of reciprocally caring relationships (Joiner, 2005). When the need for social competence is unmet, the result is perceived burdensomeness, instead. Perceived burdensomeness is a mental state consisting of one's perception of contributing negatively to relationships, and that the others, for example family members and/or close ones, would "be better off if I were gone" (Van Orden, Cukrowicz, Witte, & Joiner, 2012). Such perception is likely to arise in presence of factors such as family discordance, unemployment, and functional impairment, but it could also emerge in absence of those (Van Orden et al., 2010).

Two dimensions of interpersonal functioning are involved in perceived burdensomeness: The belief that the self is largely flawed, to the extent to consider oneself as a burden to the others, and affectively laden cognitions of self-hatred.

The Interpersonal Theory of Suicide suggests that the joint presence of thwarted belongingness and perceived burdensomeness prompts individuals to develop suicidal desires and to ideate suicide. However, the two factors are not sufficient to explain why some individuals will attempt and commit suicide at some point while others will not. In this regard, according to the theory, the capability for near lethal or lethal suicidality involves comparably lowered fear of death and increased physical tolerance of pain. When all the three factors are present, an individual is considered to be at greatest risk for engaging in lethal or near-lethal suicidal behavior (Joiner, Brown, & Wingate, 2005; Joiner, Van Orden, Witte, & Rudd, 2009a; Joiner et al., 2009b; Van Orden et al., 2010).

There is evidence that thwarted belongingness and perceived burdensomeness predict suicidal ideation, even beyond other known risk factors such as depression and hopelessness (Joiner et al., 2009b). In particular, hopelessness is defined as a system of negative beliefs in and expectancies towards oneself and one's future (Beck, Rush, Shaw, & Emery, 1979). It is part of the so-called "cognitive triad of depression" theorized by Beck (1967) and, along with a variety of depressive symptoms and thwarted psychological needs (Shneidman, 1985, 1996), it represents one of the most common psychological states experienced by suicidal individuals (Abramowitz, Storch, Keeley, & Cordell, 2007; Chioqueta & Stiles, 2003; Hawton, Casañas, Comabella, Haw, & Saunders, 2013; Levene & Parker, 2011). In a classical, prospective study conducted in a clinical sample, Beck, Brown, Berchick, Stewart, and Steer (1990) found that hopelessness, measured through the Beck Hopelessness Scale (Beck & Steer, 1988), is significantly related to suicidal behavior.

Hopelessness, suicidal ideation, and depression are strongly correlated constructs (Fino, Iliceto, Sabatello, Petrucci, & Candilera, 2014; Iliceto et al., 2014; Iliceto & Fino, 2015; Iliceto et al., 2016). Beck's (1976) triadic model posits that individuals' negative representations of themselves, the others, and their hopelessness about the future are key elements in the development and maintenance of depression and suicidality. However, it is only in recent years that research has started focusing on the relation between hopelessness, depression, and suicidal ideation from an interpersonal-psychological perspective, aiming to address their relations with thwarted belongingness and perceived burdensomeness. Hong, Gang, and Lee (2020) studied the effect of a suicidality prevention program on reducing depression, perceived burdensomeness, and suicidal ideation in a sample of rural elderly individuals, finding that the experimental group scored significantly lower in depression and perceived burdensomeness compared to the control group, leading to a substantial decrease in suicidal ideation. Duffy, Mueller, Cougle, and Joiner (2020) found a significant, positive relation between perceived burdensomeness and suicidal ideation in a sample of psychiatric patients, with such relation being confirmed even after the inclusion of a number of covariates, including depression. Schönfelder, Hallensleben, Spangenberg, Forkmann, Rath, and Glaesmera (2020) found an association between emotional abuse and suicidal ideation via perceived burdensomeness and thwarted belongingness in a sample of psychiatric inpatients with depression.

In fact, hopelessness has a central role in the Interpersonal Theory of Suicide (Joiner, 2005; Van Orden et al., 2010). According to Joiner (2005), the feeling of hopelessness about the improvement and/or resolution of thwarted belongingness and perceived burdensomeness supports the ideation and desire to commit suicide. Recent studies have attempted to clarify the relations among thwarted belongingness, perceived burdensomeness and hopelessness.

Hagan, Podlogar, Chu, and Joiner (2015) found in student and clinical samples that hopelessness moderates the interaction of thwarted belongingness and perceived burdensomeness in suicidal ideation. Similarly, Talley, Brown, Cukrowicz, and Bagge (2015) found a greater risk for suicidal ideation when thwarted belongingness, perceived burdensomeness and hopelessness co-occurred in women with high sexual self-concept ambiguity. More recently, Tucker et al. (2018) have found in a sample of undergraduate students with history of suicidality that a three-way interaction of thwarted belongingness, perceived burdensomeness and hopelessness about the two states predicts unique variance of suicidal ideation and risk. Such evidence suggests potential, great benefits from translating and validating measures of suicidal ideation from an interpersonal-psychological perspective in multiple linguistic and cultural contexts, particularly measures that show convergent validity and can be used in combination with established measures of depression and hopelessness (Lotito & Cook, 2015).

The Interpersonal Needs Questionnaire (INQ) is a self-report instrument developed in the context of the Interpersonal Theory of Suicide (Van Orden, Witte, Gordon, Bender, & Joiner, 2008a; Van Orden et al., 2012). It measures the constructs of thwarted belongingness and perceived burdensomeness and it is utilized in both research and clinical applications. Originally, the INQ included a total of 25 items (10 items measuring thwarted belongingness and 15 items measuring perceived burdensomeness) (Marty, Segal, Coolidge, & Klebe, 2012). It was later reformulated to include a total of 12 items, aiming to reduce measurement problems such as multicollinearity between the constructs (Van Orden et al., 2008a). The study by Van Orden et al. (2008a) showed that both scales included in the 12-item version have moderate internal consistency, and similar results were observed in a number of further studies on such version (Davidson, Wingate, Rasmussen, & Slish, 2009) and on the 25-item

version (Nademin et al., 2008; Van Orden et al., 2008b; You, Van Orden, & Conner, 2010). A study by Conner, Britton, Sworts, and Joiner (2007) showed a test-retest reliability of .73 for the 25-item version in adults with addiction problems.

Research has attempted to clarify the factor structure and the psychometric properties of the INQ by evaluating and comparing different versions of the instrument in a variety of populations. Bryan (2010) investigated the psychometric properties of a 10-item version of the INQ in a military sample. The author found a moderate correlation between the two INQ scales, and moderate to high correlations between each scale and other measures of mental health. The 10 items explained about the 54% of the total variance, and both constructs showed moderate internal consistency. With regards to the clinical applications of the scale, Bryan (2010) also proposed a cutoff for screening those at higher risk to manifest suicidal ideation. Freedenthal, Lamis, Osman, Kahlo, and Gutierrez (2011) analyzed the psychometric properties of the 12-item version of the INQ, observing high internal consistency values for both scales and a moderate inter-correlation. Their results supported the convergent validity of the INQ, identifying moderate to high correlations between the INQ and measures of depression, hopelessness, and suicidal ideation. Marty et al. (2012) investigated the psychometric properties of an 18-item version of the INQ, using principal axis factor analysis. Both scales showed satisfactory internal consistency and were correlated with depression, hopelessness, and suicidal ideation, providing further support to the convergent validity of the instrument.

However, the 15-item version of the INQ (INQ-15) shows comparatively best psychometric properties (Hill, Rey, Marin, Sharp, Green, & Pettit, 2015; Van Orden et al., 2012). A study by Van Orden et al. (2012) reviewed the original 25-item measurement model of the INQ by means of five independent studies, using latent variable modeling in samples

of individuals varying in age and levels of psychopathology. The results confirmed the suitability of the 15-item measurement model to represent the constructs of thwarted belongingness and perceived burdensomeness, showing no item cross-loadings and high internal consistency, and highlighting an excellent fit of the model to the data across different samples. Based on such findings, the authors suggested that "the 15 INQ items retained from the original 25 items represent relatively pure indicators of their respective construct" (Van Orden et al., 2012, p. 211). Moreover, multiple-group confirmatory analyses showed invariance across age and clinical vs. non-clinical groups, "supporting the relevance of these constructs to diverse populations" (p. 197). They concluded that "both constructs demonstrated convergent associations with related interpersonal constructs", including "loneliness and social support for belongingness and social worth and death ideation for burdensomeness, as well as prospective associations with suicidal ideation" (p. 197). Based on such evidence, the INQ-15 represents an excellent candidate for the assessment of thwarted belongingness and perceived burdensomeness in both clinical and non-clinical populations, showing excellent psychometric properties, reducing the time of administration compared to the original 25-item version, and "improving the practicality of using the tool in research and clinical settings" (Van Orden et al., 2012, p. 211). Another, recent study by Hill et al. (2015) comparing the reliability, factor structure and predictive validity of five versions of the INQ (including 10, 12, 15, 18 and 25 items, respectively) has found that the 15-item version comparatively provided one of "the best, most consistent model fit in confirmatory factor analyses" (p. 302), recommending its use in both research and clinical applications.

The INQ-15 has been successfully translated and adapted to a number of linguistic and cultural contexts, showing excellent psychometric properties, including Chinese (Zhang, Lester, Zhao, & Zhou, 2013), French (Baertschi et al., 2017; Siefert-Boukaidi, Jover,

Staccini, Pringuey, & Benoit, 2013), German (Glaesmer, Spangenberg, Scherer, & Forkmann, 2014; Hallensleben, Spangenberg, Kapusta, Forkmann, & Glaesmer, 2016), Korean (Kim & Yang, 2015; Suh et al., 2017), and Slovene (Podlogar, Žiberna, Poštuvan, & Kerr, 2016). This allows clinicians and community practitioners from those contexts to dispose of a valid and reliable psychometric tool to screen, assess, and monitor important risk factors for prevention and intervention in suicidality.

However, no Italian translation of the INQ is available. The purpose of the current study was to translate the INQ-15 (Van Orden et al., 2012) from English to Italian (henceforth INQ-15-I) and to analyze its psychometric properties in two samples: (1) An Italian adult community sample and (2) an Italian clinical sample of psychiatric patients. We tested the factor structure, the reliability, the construct validity of the INQ-15-I, and we examined whether the hypothesized theoretical and measurement model (Van Orden et al., 2012) is equivalent across the community-based and the clinical sample used. Furthermore, we explored the INQ-15-I convergent validity by analyzing its correlations with measures of depression, hopelessness, and suicidal ideation.

Methods

Participants

Community sample

The community sample included adult volunteers from the community. Participants were recruited at universities, markets, banks, shops, public parks, and post offices, in six regions from Northern, Central and Southern Italy, respectively. Although this is a convenience sample, its characteristics makes it highly representative of the demographic and socio-economic background of the wider population of Italian residents, as reported in the indicators published by ISTAT (2019). All recruited individuals provided written informed

consent prior to their participation to the study. In order to be selected, they were first screened against two exclusion criteria. Those were, respectively: (1) The ability to understand written Italian and (2) not being aged less than 18 nor more than 55 years old. The final sample included 510 participants aged 18-55 years (M = 30.2, SD = 8.9). Women represented the 54.9% of the sample and men the 45.1%. The ethnic background of all participants was white Caucasian and their first language was Italian. Regarding their socio-economic background, they were all middle to middle-upper class. We considered these individuals as healthy controls. We did not observe outliers.

Clinical Sample

The clinical sample included in-treatment psychiatric outpatients. They were recruited at the time they were in treatment at either the Third Centre of Cognitive Psychotherapy in Rome, Italy or other private psychotherapy practices from a number of different Italian locations. All recruited patients provided written informed consent prior to their participation to the study. In order to be selected, they were first screened against one inclusion criterion and one exclusion criterion. The inclusion criterion was to be currently in psychotherapeutic treatment, while the exclusion criterion was the ability to understand written Italian. The final sample included 259 participants, aged 18-79 years (M = 37.7, SD = 11.5). Women represented the 56.8% of the sample, men the 43.2%. We did not observe outliers.

Procedure

Before translating the INQ-15, we reflected on whether thwarted belongingness and perceived burdensomeness could be extrapolated to the Italian cultural context, consistent with the International Test Commission's (2016) guidelines for translating and adapting tests. In particular, we considered the following, potential issues: (1) Linguistic, psychological, and cultural differences in the target populations; (2) the legitimacy of the constructs measured in

the target linguistic group; (3) the appropriateness of the translation design and procedure. In order to address these issues, we reviewed the literature from the Interpersonal Theory of Suicide (Joiner, 2005; Tucker et al., 2018; Van Orden et al., 2010, 2012) in relation to other literature on the role of interpersonal-psychological factors in suicidality in the Italian context (Fino et al., 2014; Iliceto et al., 2014; Iliceto & Fino, 2015; Iliceto et al., 2016). When necessary, we used independent psychometric and clinical expertise to discuss and review the meaning and adaptability of the INQ-15 items to the Italian linguistic context, along with any possible risks relevant to the interpretation of scores. Using evidence from the literature and expert consensus, we hypothesized that thwarted belongingness and perceived burdensomeness could be successfully extrapolated to the Italian context, based on the evaluation of the linguistic, psychological, and cultural suitability of the constructs to the target groups, with the structure and items of the INQ-15 being adequate to represent and measure them in community and clinical populations.

Therefore, we proceeded to translate the INQ-15 from English to Italian. The instrument was translated by one the authors (PI), while another author (LD) independently reviewed the translation. This version was submitted to an English mother-tongue professional translator (blind to the original measure), who independently assessed the translation by recurring to back-translation. The procedure was iterative and led to a final consensus on the final version of the instrument. The same translation procedure was applied to the Beck Scale for Suicide Ideation (Beck & Steer 1991). The final version of the INQ-15-I is provided in the Appendix.

Aiming to evaluate and respond to any possible risks associated to the study procedure, we designed the latter based on evidence from the literature. In particular, the recent meta-analysis by Blades, Stritzke, Page, and Brown (2018, p. 10) on the benefits and

risks of suicide research on participants, suggests that "the best available evidence shows that presumed risks of research participation are unsubstantiated, but instead participation is associated with benefits, the need for safeguards should not only be relaxed, but not doing so fails to uphold the ethical principle of justice, where potential research participants might be deprived of the opportunity to receive the benefits of participating in the research." However, in order to protect those at higher risk, as possibly emerging from the results of assessment and clinical interviews, dedicated clinical support was made available, with trained professionals supervising variations in the participants' mental health not only during their participation to the study, but even beyond, offering psychotherapeutic treatment when necessary. The study was approved by an internal ethical committee, and two external reviewers, ensuring compliance to ethical protocols on data obtained from human participants (Declaration of Helsinki).

Measures

Participants were administered the following set of measures: The Italian translations of the INQ-15 (Van Orden et al., 2012) and of the Beck Scale for Suicide Ideation (BSS: Beck & Steer 1991), the validated Italian version (Ghisi, Flebus, Montano, Sanavio, & Sica, 2006) of the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), and the validated Italian version (Pompili, Iliceto, Lester, Innamorati, Girardi, & Tatarelli, 2009; see also Pompili, Tatarelli, Rogers, & Lester, 2007) of the Beck Hopelessness Scale (BHS: Beck & Steer, 1988). Because the Beck's instruments are not in the public domain, a payment of fees was required for their use, with the authors relying on their private funds.

The INQ-15 is a 15-item self-report instrument measuring an individual's set of current beliefs and experiences, underlying the constructs of thwarted belongingness and perceived burdensomeness, respectively. Respondents are asked to indicate the degree to

which each item is true for them, having in mind the recent period, on a 7-point Likert scale anchored as follows: 1 “Not at all true for me”, 4 “Somewhat true for me”, and 7 “Very true for me”. Higher scores represent higher levels of thwarted belongingness (items 7 to 15) and perceived burdensomeness (items 1 to 6). Most items across both scales are positively keyed, with few exceptions requiring reverse scoring. Our scoring approach differed from previous studies in that we averaged instead of summing up individual item scores at the subscales’ level.

The BDI-II is a 21-item self-report measure assessing the severity of depressive symptomatology. Respondents are asked to select statements that reflect how they have felt over the last two weeks. BDI-II scores range between 0 and 63. Categorical depression ratings are “minimal” (0-13), “mild” (14-19), “moderate” (20-28), and “severe” (29-63). The authors originally identified a cut-off of 17 in a clinical sample, with a 93% true-positive rate and 18% false-positive rate. Scores higher than 17 indicate the presence of depressive states. In the original validation sample, Cronbach’s alpha was = .92, and test-retest reliability was high and significant (r = .93; p < .001).

The BHS is a 20-item true or false self-report measure developed to operationalize the construct of hopelessness. Research showed a positive relationship between BHS scores and measures of depression, suicidal intent, and current suicidal ideation. As an alternative to the true/false response format, we used a Likert-type scale with 5-point format, with two extreme options of “very strongly disagree” (0) and “very strongly agree” (4), aiming to increase response sensitivity. In order to score participants, we reversed the scoring of positive items and then summed the 20 items to yield a total score ranging from 0 to 80. Such Likert-type version was evaluated in previous research, showing good validity and reliability (Fino et al., 2014; Iliceto et al., 2014; Iliceto & Fino, 2015; Iliceto et al., 2015).

The BSS is a 21-item self-report measure assessing the severity of suicidal behavior and ideation. Each item is scored on a scale ranging from 0 to 2. Only the first 19 items are scored, whilst the last 2 items are designed to collect information on the history of suicide attempts. The BSS total score ranges from 0 to 38 points, with higher scores indicating higher levels of suicidal ideation.

Statistical Analyses

Mean substitution was used for handling missing data, when required (< 15% of the data). For continuous variables, we used two-tailed *t*-tests, Pearson's correlations, while Cohen's *d* (Cohen, 1988) was used to assess the magnitude of effects, when significant. For categorical variables, we used chi-square tests with Yates' correction. We assessed the reliability of the subscale scores by means of McDonald's omega, considered as a superior measure of reliability compared to the commonly reported Cronbach's alpha (McNeish, 2018).

Factorial invariance and latent mean structures were tested by using Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA). SEM relies on several statistical tests to determine the adequacy of model fit to the empirical data. In SEM, it is possible to analyze relations between observed variables and latent variables in addition to a measurement model. CFA allows for testing specific hypotheses on the relation between observed variables and their underlying, latent constructs. The method implies the formal specification of the measurement instrument in terms of a factor model, the statistical fit of the factor model to the observed data (variances and covariances, or correlations), the assessment of the model fit, and the interpretation of whether the model is consistent with the data (Bollen, 1989; Kline, 2011).

A series of multigroup CFA models were performed to examine measurement invariance (i.e. configural, metric, scalar, and strict invariance) and latent mean structures. In particular, in order to test whether the measurement model is invariant across groups, it is preferable to first run a model in which only the factor loadings are constrained to be equal (i.e. a measurement model). If the hypothesis of group equivalence is supported, factor-loading parameters remain constrained. Equality constraints are then placed in correspondence to factor variances and covariances (i.e. a structural model) (Vandenberg & Lance, 2000).

Configural invariance implies that each common factor is associated with identical measurement sets across groups. Testing configural invariance requires examining the strength of the relation between the observed variables and their underlying, latent constructs. This model has no equality constraints imposed on the estimated parameters, thus allowing different parameters to vary across groups. Such multi-group model has two main functions: First, it allows for invariance tests to be conducted across multiple groups, simultaneously. Second, in testing for invariance, the fit of the configural model provides the baseline value against which subsequent, specified invariance models can be compared. Metric invariance tests the hypothesis that the observed variables have identical meanings across groups. It is tested by imposing equality constraints on their corresponding factor loadings and then comparing the fit of the constrained model to the fit of the configural model. Scalar invariance tests the hypothesis that the intercepts computed from the observed variables are the same across groups. It is assessed by imposing equality constraints on the intercepts and then assessing model fit in comparison to the metric invariant model. Strict invariance tests the hypothesis of equality of variables through factor residual variances across groups. The model is finally compared to the scalar invariant model.

Given the multifaceted nature of model fit assessment in SEM, we decided to use a set of fit indices, as required to control for sampling variability. In fact, if the sample size is relatively large, any structural model is potentially flawed. Specifically, we used the χ^2 index to compare the hypothesized model to the independence model, the Comparative Fit Index (CFI; Bentler, 1990) and the Tucker-Lewis Index (TLI; Tucker-Lewis 1973) to test if all relations among measured variables are equal to zero, the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) and the Standardized Root Mean Square Residual (SRMR; Jöreskog & Sörbom, 1996) to measure the difference between the reproduced covariance matrix and the population covariance matrix. In line with recommendations from the literature (Browne & Cudeck, 1993; Hu & Bentler, 1998; 1999), we considered the following values as indicating good fit: A non-significant χ^2, the CFI > .95, the TLI ≥.95, the RMSEA close to or lower than .06, and the SRMR close to or lower than .08. Finally, we compared nested models using the χ^2 difference test and the change in CFI, and we considered values ≥ 1.96 of the Critical Ratio (CR) *z* statistic as indicating differences between latent means (Cheung, 2008; Cheung & Rensvold, 2002).

All analyses were performed by means of the statistical package SPSS 19.0 (SPSS Inc., Chicago, IL, USA), except for the tests of multivariate normality assumptions, for which we used the R package MVN (Korkmaz, Goksuluk, & Zararsiz, 2016), and for SEM and CFA, for which we used AMOS 20.0 (AMOS: Analysis of Moment Structures) (Arbuckle, 2011).

Results

In the community sample, we found no gender differences in age ($t_{(508)} = 1.33$; $p = .18$). Suicidal ideation was found in 2.4% of participants from the community sample. In the clinical sample, we found no differences in age ($t_{(257)} = .83$; $p = .40$) between women (*M* =

38.24, *SD* = 12.4) and men (*M* = 37.03, *SD* = 10.2). In this sample, the selection of participants accounted for several different diagnoses, making it largely heterogeneous. The diagnostic criteria used to establish the diagnosis were based on the DSM-5 classification (American Psychiatric Association, 2013), except for few cases (e.g. personality disorders not included in the DSM-5 classification, such as the passive-aggressive personality disorder). The 14.1% of participants from the clinical sample scored above established clinical cut-offs for suicidal ideation.

Regarding the analysis of the reliability of depression, hopelessness, and suicidal ideation scales, the observed values of McDonald's omega were, respectively for the community and the clinical samples: .788 and .831 (BDI-II), .814 and .827 (BHS), and .748 and .815 (BSS).

Results of *t*-tests conducted on all the measures used in the study showed statistically significant group differences. Patients scored significantly higher than controls in all variables, with Cohen's *d* values indicating small to large changes (Table 1).

[Table 1: About here]

Confirmatory Factor Analysis

We first tested the assumptions of multivariate normality by using Mardia's skewness and kurtosis tests. Results from the community sample showed a skewness statistic of 2.13 ($p = .12$) and a kurtosis statistic of 9.12 ($p = .08$). In the clinical sample, results showed a skewness statistic of 31.52 ($p = .006$) and a kurtosis statistic of 3.94 ($p = .04$). As expected, we concluded that data do not follow the multivariate normal distribution. However, all exogenous variables from both samples were normally distributed in the variance-covariance matrix, confirming the adequacy of our estimation methods to test the study hypotheses (Arbuckle, 2011).

Multi-group CFA models were performed on the variance-covariance matrix and the estimated parameters using Maximum Likelihood. In particular, we aimed to test the hypothesis that the observed variables load on their relevant INQ-15-I factors, hence confirming the original theoretical model, and to examine whether the components of the measurement model and the underlying structure are invariant across the two groups of interest (i.e. community and clinical) (Byrne, Shavelson, & Muthén, 1989). In this model, the INQ-15-I items represent the observed variables, and the underlying latent structure is represented by the thwarted belongingness factor (items 7 to 15) and the perceived burdensomeness factor (items 1 to 6). Specifically, we tested for the equivalence of the factor loadings (measurement invariance) and factor correlations (structural invariance) across the two groups. In order to test factorial equivalence, given that the estimation of baseline models requires no between-group constraints, we first analyzed each group separately and then decided on model retention based on the evaluation of model fit in both groups.

The fit of the first model to the data was inadequate both in the community group ($\chi^2_{(87)}$ = 192.26; CFI = .90; RMSEA = .09) and in the clinical group ($\chi^2_{(89)}$ = 228.43; CFI = .78; RMSEA = .13). Following the suggestions by Byrne (2010), we used modification indices to attempt improving the model fit. Particularly, we allowed the estimation of two error covariances relevant to the thwarted belongingness factor (“These days, other people care about me” and “These days, I feel like I belong”) and two error covariances relevant to the perceived burdensomeness factor (“These days the people in my life would be better off if I were gone” and “These days the people in my life would be happier without me”). Item error covariances indicate that two indicators have something in common and covary for other reasons than the shared influence of the latent factor. These modifications led us to specify a new model, which resulted in a much better fit in both the community group ($\chi^2_{(81)}$

= 123.19; CFI = .97; RMSEA = .05) and the clinical group ($\chi^2_{(81)}$ = 104.25; CFI = .96; RMSEA = .05). Goodness-of-fit statistics for the baseline models in each group are summarized in Table 2.

[Table 2: About here]

We examined configural invariance to investigate multi-group representation of the baseline models with freely estimated factor loadings in both groups simultaneously. The configural model provided the baseline value against which all subsequent specified invariance models were compared. When we found evidence of invariance across the two groups, we estimated latent mean differences, namely unobserved means derived from the observed variables' average loadings on the factor. We chose the community group as the reference group, and fixed to zero the means of the latent factors. The clinical group served as the comparison group, and for this reason we let the means of the latent factors free to vary. As expected, results showed an adequate configural model ($\chi^2_{(162)}$ = 241.16; CFI = .955; RMSEA = .047), indicating that the hypothesized multi-group model fits the data, both in the community group and the clinical group (Table 3, Model 1).

Metric invariance was subsequently tested by imposing equality constraints on all factor loadings, across the two groups (Model 2, Table 3). The fit of this model to the data was marginally better than the one from the configural model ($\chi^2_{(175)}$ = 256.05; CFI = .954; RMSEA = .046). Model 3 in Table 3 represents the scalar invariance tested by constraining item intercepts to be equal across the groups, finding similar results to Model 2 ($\chi^2_{(178)}$ = 267.46; CFI = .949; RMSEA = .048). We then tested Model 4 (Table 3) to examine whether variables and factor error variances were equal across both groups, and results showed a marginally worse fit than those observed in Model 2 and Model 3 ($\chi^2_{(201)}$ = 324.09; CFI = .930; RMSEA = .053). Amongst all models, the change in χ^2 was not significant, and overall

these results showed that the error variances for the two latent factors and the INQ-15-I items were equal across groups, and in all nested models the differences in CFI were equal to .01, reflecting model invariance (Cheung, 2008; Cheung & Rensvold, 2002). Only for Model 4 we observed an acceptable CFI difference, equal to .019.

The two latent factors presented a low correlation in controls (r = .04; n.s.) and a moderate correlation in patients (r = .55; p < .001). All standardized loadings ranged, for the community group and the clinical group, from .506 to .827 and from .608 to .820, respectively. Squared multiple correlations, indicating the amount of variance in the observed variables that is accounted for by the common factors, ranged from 25% to 68% and from 36% to 67%, respectively (Table 4).

[Table 4: About Here]

With regards to reliability, values of McDonald's omega were, respectively for the community group and the clinical group, .803 and .839 (thwarted belongingness) and .822 and .875 (perceived burdensomeness).

We examined the INQ-15 construct validity by computing correlations between the two INQ factors and between each factor and depression (BDI-II), hopelessness (BHS), and suicidal ideation (BSS). Pearson's correlation values are reported in Table 5. Results showed that the two INQ-15 factors are inter-correlated, with each correlating significantly and positively with depression, hopelessness, and suicidal ideation, consistently with theoretical expectations. Higher correlation values observed in the clinical sample compared to the community sample.

[Table 5: About here]

Discussion

The aims of the current study were to translate the INQ-15 from English to Italian and to investigate its factor structure, reliability, and validity in a community sample and a clinical sample. In particular, we hypothesized that the two-factor model identified in previous research validly represents the theoretical constructs of thwarted belongingness and perceived burdensomeness in the Italian context and that this is invariant across the two groups of participants. Our results confirm the validity of the two-factor model for the INQ-15-I, with the underlying theoretical structure being invariant across the two groups, supporting evidence from previous research.

Previous studies utilized different versions of the INQ in English speaking samples of adults, undergraduate students, individuals with substance abuse disorders and military personnel, with comparable results to the present study (Bryan, 2010; Conner et al., 2007; Cukrowicz, Cheavens, Van Orden, Ragain, & Cook, 2011; Davidson et al., 2009; Marty et al., 2012; Nademin et al., 2008; Van Orden et al, 2008a; Van Orden, et al., 2008b; You et al., 2011). Interestingly, results from the validation of the INQ-15 in other cultural contexts, showed variable results. A recent validation study in Spanish-speaking American college students and Mexican inpatients (Silva et al., 2018) found that the original two-factor model does not represent a good fit, rather a nine-item, two-factor measurement model deriving from the elimination of poor fitting items provided better fit across the three samples. In contrast, research conducted in German populations (Glaesmer et al., 2014; Hallensleben et al., 2016) found similar results to the current study, supporting the validity of the 15-item version of the INQ.

Similar to what observed in present study, in the study by Hallensleben et al. (2016), modifications to the initially hypothesized model were necessary, resulting in the significant improvement of fit indices. In particular, modifications included the release of error

covariances relevant to the same items for which error covariances were released in the present study. A difference between our results and the results from the studies by Van Orden et al. (2012) and Hallensleben et al. (2016) is in item 9 of the INQ-15-I. In fact, in both the Italian samples used, we found that item 9 has an adequate factor loading, while those two studies reported a significantly lower loading compared to the other items. Hallensleben et al. (2016) related such result to the item's content, and they argued that this item might reveal problematic in both English and German. They based their argument on the difficulty to measure social interactions from a more "objective" perspective compared to the view subsumed by the content of the other items, relying on the definition of thwarted belongingness as the perception of being socially disintegrated rather than an objective lack of social connection. They therefore recommended caution in using item 9 and invited to consider redrafting. However, the results from the present study show that this problem does not affect the Italian version of the instrument. One possible interpretation is that by "revising an existing scale to include new items (to improve cultural relevancy), comparisons across cultures may be limited by measurement differences of the constructs", as commented by Silva et al. (2018, p. 23) with regards to the Spanish version of the INQ, to which they also proposed modifications in number of items compared to the original English version. In this vein, although we find the results of the current study encouraging, we recommend caution in their interpretation, acknowledging that the role of cultural and linguistic differences in expression of "objectivity" and "subjectivity" in social interactions as measured through the INQ-15-I would deserve further testing.

Regarding reliability, results from the present study support evidence found in previous studies. In fact, both the subscales of the INQ-15-I are internally consistent and reliable, with values similar to those identified in the German validation study by

Hallensleben et al. (2016). With respect to validity, in the community sample, we did not observe high correlations between the two INQ-15-I factors, nor between each factor and measures of depression, hopelessness, and suicidal ideation. Conversely, significant high correlations among the same measures were observed in the clinical sample. We believe these results are of great interest. In fact, previous studies conducted found inconsistencies in the study of the convergent validity of the INQ in community samples. For example, Freedenthal et al. (2011) found positive correlations between the INQ factors and depression, hopelessness and suicidal ideation in non-clinical samples. Similarly, Marty et al. (2012) observed correlations between both thwarted belongingness and perceived burdensomeness and mental health. In particular, in the latter study, both factors resulted positively associated with risk for late-life suicide (i.e., hopelessness, depression, suicidal ideation, and low meaning in life) in US community-dwelling older individuals. More recently, Silva et al. (2018) found that thwarted belongingness and perceived burdensomeness are also positively associated with concurrent suicidal ideation (presence-absence and severity) in Spanish-speaking samples. Chu et al. (2017) argued that the variability observed across different studies with regards to the validity of the INQ may be due to the different version of the instrument used and the specific characteristics and composition of the samples, challenging the comparability of results. However, a latest paper by Iliceto et al. (2020) showed significant and high correlations between the two INQ-15 factors and between each factor and measures of depression, hopelessness, and suicidal ideation in a community sample, suggesting the validity of the INQ-15 to measure constructs that are associated to suicidal ideation. Further research is needed to clarify the convergent validity of the INQ-15-I in community samples.

In the current study, we also tested the measurement invariance of the INQ-15-I. Results confirmed the good fit of the model in both the community sample and the clinical sample. Strong measurement invariance across groups emerged from the analysis of configural, metric, scalar and strict invariance, highlighting that both subscales of the INQ-15-I work adequately in both community and clinical populations. Moreover, results from the study show mean differences between non-clinical and clinical groups in perceived thwarted belongingness and burdensomeness, as well as in hopelessness, suicidal ideation, and depression.

However, the current study has some limitations that affect the generalizability of the findings. First, the cross-sectional nature of the study design and the data based on self-report instruments. Second, the background of participants from the community, selected from middle to upper-middle class backgrounds. Third, the procedure, not including a pilot study to review the suitability of the constructs and the validity of the translation. Fourth, the CFA approach used, in contrast to an exploratory approach to the psychometric properties of the scale, limiting the quality of the information obtained through the analysis, particularly with regards to the factor loadings and the explained variance of the scale. Finally, socio-demographic, ethnicity and first language data of the clinical group were not available.

Conclusion

In conclusion, results from the present study confirm the reliability and validity of the INQ-15-I instrument in the Italian context, and the conformity of the measurement of its theoretical constructs to existing empirical evidence in support of the Interpersonal Theory of Suicide. The significant correlations observed on both theoretical factors with suicidal ideation, as evidenced in both samples and particularly in the clinical sample of psychiatric patients, will have dramatic implications for research and practice developments in the local

context. The INQ-15-I will provide psychologists, psychiatrists and other mental health practitioners with a reliable and valid tool to help prevent suicidality in psychiatric patients and screen those in the community who might be at higher risk of suicide. In fact, the instrument can be used in risk assessment, supporting the identification of treatment targets, and in tracking treatment progress. Nevertheless, the evidence of invariance across groups is consistent with the theoretical and measurement framework provided by the Interpersonal Theory of Suicide. In the light of the vast literature accumulating on the empirical foundations and the value of the theory in explaining and help predicting suicidal ideation, we believe that the translation and validation of the INQ-15 in Italian will ultimately support the refinement of national public health prevention and intervention strategies, facilitating the implementation of effective policies based on robust theoretical foundations and empirical evidence. The study results will also advantage individual local practitioners, providing them with a valid instrument for the assessment of suicide risk in clinical settings and supporting their assessments of suicidal ideation risk and protective factors.

We invite future research to contribute to shed a light on possible cultural and linguistic differences in the translation and adaptation of the scale in other cultural contexts and targeted, at-risk population, and to adopt a prospective, longitudinal perspective in the evaluation of thwarted belongingness and perceived burdensomeness. Nonetheless, we recommend future studies to investigate the psychometric properties of the scale by using Exploratory Factor Analysis in combination to CFA, aiming to address unanswered questions on the factor structure, factor loadings and explained variance of the scale, as well as Item Response Theory models to examine item discrimination and to test the adequacy of the seven-point response sets used.

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Conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Table 1

Comparisons between groups

	Controls (*N* = 510)		**Patients (*N* = 259)**		*t*	p	Cohen's *d*
	Mean	*SD*	*Mean*	*SD*			
Perceived burdensomeness (INQ-15-I)	1.65	.59	1.89	1.20	3.78	<.001	.25
Thwarted belongingness (INQ-15-I)	3.23	1.08	3.59	1.23	4.22	<.001	.31
Hopelessness (BHS)	22.16	11.05	38.76	6.62	22.22	<.001	1.82
Suicidal Ideation (BSS)	2.90	1.60	6.93	5.73	14.74	<.001	.95
Depression (BDI-II)	9.61	4.36	18.15	12.82	13.58	<.001	.89

Table 2

Goodness-of-fit Statistics for determination of baseline models

Controls	$\chi^2_{(df)}$	p	CFI	TLI	RMSEA	SMRS
1) Hypothesized two-factor model	$192.26_{(87)}$	<.001	.90	.88	.09	.08
2) Model 1 with 2 errors of covariance specified	$123.19_{(81)}$	.002	.97	.96	.05	.06
Patients						
1) Hypothesized two-factor model	$228.43_{(89)}$	<.001	.78	.74	.13	.12
2) Model 1 with 2 errors of covariance specified	$104.25_{(81)}$	.05	.96	.95	.05	.04

Table 3

Goodness-of-fit Statistics for tests of Multi-group Invariance

Model	$\chi^2_{(df)}$	χ^2 /df	$\Delta\chi^2$ (Δ_{df})	CFI	ΔCFI	TLI	RMSEA	SMRS
1. Configural	$241.16_{(162)}$	1.49		.955		.941	.047	.041
2. Equal factor loadings (Metric)	$256.05_{(175)}$	1.46	$14.89_{(13)}$	.954	.001	.944	.046	.039
3. Equal indicator intercepts (Scalar)	$267.46_{(178)}$	1.50	$11.41_{(3)}$	.949	.005	.940	.048	.042
4. Equal indicator error variances (Strict)	$324.09_{(201)}$	1.61	$56.63_{(23)}$	.930	.019	.926	.053	.043

Note. $\Delta\chi^2$ (Δ_{df}) = Chi-square (degrees of freedom) difference. ΔCFI = Difference in CFI, when change is ≤.01 reflects model invariance

Table 4

Estimates of the groups

	Controls (*N* = 510)		**Patients (*N* = 259)**	
Item	Factor loadings	Squared multiple correlations	Factor loadings	Squared multiple correlations
bur1	.669	.448	.658	.433
bur2	.646	.418	.755	.570
bur3	.713	.508	.779	.606
bur4	.736	.542	.661	.437
bur5	.506	.256	.727	.528
bur6	.552	.305	.679	.461
bel1	.778	.606	.740	.547
bel2	.729	.531	.694	.481
bel3	.728	.532	.728	.530

bel4	.718	.515	.796	.634
bel5	.574	.329	.727	.528
bel6	.644	.415	.692	.479
bel7	.525	.275	.641	.411
bel8	.547	.299	.608	.369
bel9	.827	.684	.820	.673

Table 5

Pearson's correlations between the scales (p <.01)**

Controls (*N* = 510)

	PB	***TB***	Hopelessness (BHS)	Suicidal Ideation (BSS)
PB	1			
TB	.037	1		
Hopelessness (BHS)	.018	.448**	1	
Suicidal Ideation (BSS)	.016	.083	.214**	1
Depression (BDI-II)	.028	.298**	.413**	.206**

Patients (*N* = 259)

	PB	***TB***	Hopelessness (BHS)	Suicidal Ideation (BSS)
PB	1			
TB	.428**	1		
Hopelessness (BHS)	.312**	.276**	1	
Suicidal Ideation (BSS)	.466**	.306**	.332**	1
Depression (BDI-II)	.624**	.453**	.462**	.436**

Appendix

INQ-15-I

Le domande seguenti ti chiedono di pensare a te stesso e ad altre persone. Per favore rispondi ad ogni domanda utilizzando le tue attuali convinzioni ed esperienze, NON ciò che pensi sia vero in generale, o quello che potrebbe essere vero per le altre persone. Per favore basa le tue risposte su come ti sei sentito recentemente. Utilizza la scala che segue per trovare il numero che meglio corrisponde a come ti senti, e contrassegnalo. Non ci sono risposte giuste o sbagliate: siamo interessati a ciò che *tu* pensi e senti.

[*The following questions ask you to think about yourself and other people. Please respond to each question by using your own current beliefs and experiences, NOT what you think is true in general, or what might be true for other people. Please base your responses on how you've been feeling recently. Use the rating scale to find the number that best matches how you feel and circle that number. There are no right or wrong answers: we are interested in what you think and feel*.]

1	2	3	4	5	6	7
Per nulla vero per me [*Not at all true for me*]			Abbastanza vero per me [*Somewhat true for me*]			Molto vero per me [*Very True for me*]

1	In questi giorni le persone della mia vita starebbero meglio se io fossi morto. [*These days the people in my life would be better off if I were gone*.]	1	2	3	4	5	6	7
2	In questi giorni le persone della mia vita sarebbero più felici senza di me. [*These days the people in my life would be happier without me.*]	1	2	3	4	5	6	7

3	In questi giorni penso di essere un peso per la società. [*These days I think I am a burden on society.*]	1	2	3	4	5	6	7
4	In questi giorni penso che la mia morte sarebbe un sollievo per le persone della mia vita. [*These days I think my death would be a relief to the people in my life.*]	1	2	3	4	5	6	7
5	In questi giorni penso che le persone della mia vita vorrebbero potersi liberare di me. [*These days I think the people in my life wish they could be rid of me.*]	1	2	3	4	5	6	7
6	In questi giorni penso di rendere le cose peggiori per le persone della mia vita. [*These days I think I make things worse for the people in my life.*]	1	2	3	4	5	6	7
7	In questi giorni, le altre persone si preoccupano per me. [*These days, other people care about me.*]	1	2	3	4	5	6	7
8	In questi giorni, mi sento come se facessi parte di qualcosa. [*These days, I feel like I belong.*]	1	2	3	4	5	6	7
9	In questi giorni, raramente ho rapporti con le persone che si prendono cura di me. [*These days, I rarely interact with people who care about me.*]	1	2	3	4	5	6	7
10	In questi giorni, sono fortunato ad avere molti amici che si prendono cura di me e mi aiutano. [*These days, I am fortunate to have many caring and supportive friends.*]	1	2	3	4	5	6	7
11	In questi giorni, mi sento distaccato dagli altri. [*These days, I feel disconnected from other people.*]	1	2	3	4	5	6	7
12	In questi giorni, mi sento spesso fuori luogo nelle occasioni sociali. [*These days, I often feel like an outsider in social gatherings.*]	1	2	3	4	5	6	7
13	In questi giorni, sento che ci sono delle persone alle quali posso rivolgermi in caso di bisogno. [*These days, I feel that there are people I can turn to in times of need.*]	1	2	3	4	5	6	7
14	In questi giorni, sono vicino agli altri.	1	2	3	4	5	6	7

	[*These days, I am close to other people.*]							
15	In questi giorni, ho almeno una interazione soddisfacente al giorno. [*These days, I have at least one satisfying interaction every day.*]	1	2	3	4	5	6	7