Measurement invariance of the Interpersonal Needs Questionnaire (INQ-15) across sexual orientation, gender identity, and race/ethnicity in a sample of sexual minority young adults

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Abstract:

Sexual minority (e.g., gay, lesbian, bisexual) people are at increased risk for suicidal thoughts and behaviors compared to their heterosexual peers. The interpersonal theory of suicide proposes that perceived burdensomeness and thwarted belongingness are central to the desire to die, and both are associated with suicidal ideation in sexual minority samples. The Interpersonal Needs Questionnaire (INQ) was developed to measure these risk factors and has become the most commonly used measure. However, it is unknown whether the INQ demonstrates similar measurement properties across subgroups of sexual minority people. Therefore, the goal of this study was to examine whether the 15-item version of the INQ exhibited measurement invariance (MI) across sexual orientation (gay/lesbian vs. bi +), gender identity (cisgender men vs. cisgender women vs. transgender/gender diverse individuals), and race/ethnicity (non-Latinx White individuals vs. people of color) in a sample of 792 sexual minority young adults (ages 18–29). A series of multigroup measurement invariance models indicated that the INQ-15 met strict invariance (i.e., equal factor loadings, item intercepts, and residual variances) across all three dimensions of identity. This indicates that it can be used and compared across diverse samples of sexual minority young adults. Results also indicated that perceived burdensomeness was greater for transgender/gender diverse individuals than for cisgender men and women, and that perceived burdensomeness and thwarted belongingness were greater for people of color than for non-Latinx White individuals. In contrast, gay/lesbian and bi + individuals did not differ. Additional research is needed to understand the factors that account for these group differences.

Keywords: Interpersonal Needs Questionnaire (INQ-15) | sexual orientation | gender identity | race and ethnicity | young adults | lgbtqia+

Article:

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Suicide is the third leading cause of death for young people (Centers for Disease Control and Prevention, 2022), and sexual minority (e.g., gay, lesbian, bisexual) people are at increased risk for suicidal thoughts and behaviors compared to their heterosexual peers (Hottes et al., 2016; King et al., 2008). The interpersonal theory of suicide is one of the leading theories proposed to explain the risk for suicidal thoughts and behaviors (Joiner, 2005). Specifically, it proposes that feeling like a burden on important people in one's life (perceived burdensomeness) and lacking relationships that allow for reciprocal care (thwarted belongingness) are central to suicidal ideation and the desire to die. When accompanied by heightened fearlessness and pain insensitivity (acquired capability for suicide), individuals are more likely to act on ideation by attempting suicide. The interpersonal theory of suicide has received extensive empirical support, including a meta-analysis showing mean correlations of .48 and .37 between perceived burdensomeness and thwarted belongingness, respectively, and suicidal ideation (Chu et al., 2017).

Application of the Interpersonal Theory of Suicide to Sexual Minority People

Increasingly, the interpersonal theory of suicide has been used to understand suicidal thoughts and behaviors among sexual minority people. Studies have demonstrated that perceived burdensomeness and thwarted belongingness are associated with suicidal ideation in this population (Chang et al., 2021; Pate & Anestis, 2020; Plöderl & Fartacek, 2005; Wolford-Clevenger et al., 2020), and that sexual minority people report greater perceived burdensomeness (Hill & Pettit, 2012; Pate & Anestis, 2020; Silva et al., 2015) and thwarted belongingness (Pate & Anestis, 2020; Silva et al., 2015) compared to heterosexual people. There is also evidence that bisexual people report greater perceived burdensomeness (Silva et al., 2015; Wolford-Clevenger et al., 2020) and thwarted belongingness (Wolford-Clevenger et al., 2020) compared to gay/lesbian people, but other studies have not found these differences (Chang et al., 2021, 2022).

Prior studies have also found that transgender/gender diverse youth report greater perceived burdensomeness and thwarted belongingness than cisgender sexual minority youth (Chang et al., 2021), and that individuals who report a gender identity other than male or female report greater perceived burdensomeness and thwarted belongingness compared to those who identify as male or female (in a sample of heterosexual and sexual minority individuals; Pate & Anestis, 2020). Finally, although one study found that heterosexual and sexual minority individuals who identified as a race other than White or Black/African American reported greater perceived burdensomeness and thwarted belongingness than those who identified as White/Caucasian or Black/African American (Pate & Anestis, 2020), another study found that race/ethnicity was not significantly associated with perceived burdensomeness and thwarted belongingness in a sample of lesbian, gay, bisexual, transgender, and queer (LGBTQ+) youth (Chang et al., 2021).

Measurement of Perceived Burdensomeness and Thwarted Belongingness

The Interpersonal Needs Questionnaire (INQ) was developed to measure perceived burdensomeness and thwarted belongingness (Van Orden et al., 2012), and it has become the most commonly used measure of these constructs. In fact, the INQ was used by 96% of 114 studies included in a meta-analysis of the interpersonal theory of suicide (Chu et al., 2017). In developing the most recent 15-item version of the INQ following earlier 10-, 12-, and 18-item versions (Bryan et al., 2010; Joiner et al., 2009; Van Orden et al., 2008), the authors provided support for its two-factor structure and its invariance across age (younger vs. older adults) and level of psychopathology (nonclinical vs. clinical populations; Van Orden et al., 2012).

Although the interpersonal theory of suicide is increasingly being used to understand suicidal thoughts and behaviors among sexual minority people, it is unknown whether the INQ demonstrates similar measurement properties across subgroups of sexual minority people. The available evidence suggests that there may be group differences in perceived burdensomeness and thwarted belongingness across sexual orientation, gender identity, and race/ethnicity among sexual minority people. However, given the lack of psychometric testing in diverse sexual minority samples, the mixed evidence of mean-level differences across groups could be due to biases in measurement as opposed to "true" differences. That is, unidentified measurement bias may obscure, attenuate, or even accentuate true mean-level differences. This bias may arise as subgroups of sexual minority people (e.g., cisgender vs. transgender/gender diverse) that share common lived experiences due to distinct discriminatory experiences may respond in systematically similar ways to certain items. For example, given the increase in antitransgender legislation in recent years (Lavietes & Ramons, 2022), transgender/gender diverse sexual minority people may be more likely to endorse the item "These days, I think I am a burden on society" compared to cisgender sexual minority people. Therefore, it is critical to know if there are systematic differences in how subgroups of sexual minority people respond to items on the INQ to know if mean-level differences across groups can be interpreted.

The Present Study

The goal of the present study was to test whether the INQ-15 exhibited measurement invariance (MI; configural, weak/metric, strong/scalar, and strict) across sexual orientation (gay/lesbian vs. bi+), gender identity (cisgender men vs. cisgender women vs. transgender/gender diverse individuals), and race/ethnicity (non-Latinx White individuals vs. people of color) in a sample of 792 sexual minority young adults (ages 18–29). Identifying and quantifying measurement invariance may enhance understanding of perceived burdensomeness and thwarted belongingness in sexual minority young adults and may increase the precision with which these constructs may be associated with important outcomes such as suicidal ideation.

Method

Procedure

We used baseline data from a longitudinal study of risk factors for suicidal thoughts and behaviors among sexual minority young adults (Chang et al., 2022). Participants were recruited in 2020 through Prolific, and required to meet the following criteria: (a) 18–29 years old; (b) identify as

gay, lesbian, or bisexual; (c) live in the U.S.; and (d) be able to read English. Prescreening procedures were used to recruit equal proportions of gay/lesbian and bisexual individuals. Within each group, we separately recruited for cisgender women, cisgender men, and transgender/gender diverse individuals to ensure equal representation. Prolific's screening question for sexual orientation only included one response option that reflected attraction to more than one gender (bisexual), but we included a more comprehensive assessment in our baseline survey with a wider range of response options (e.g., pansexual, queer, fluid; collectively "bi+").

After providing informed consent, participants completed the baseline survey, which was administered via Qualtrics. Then, participants were contacted using their unique user codes to complete 1- and 2-month follow-up surveys, which were abbreviated versions of the baseline survey. We employed several data quality checks to reduce the chances of bots or fraudulent or careless responders completing our study (see Supplemental Materials). Participants were compensated $3.25 for the 30-min baseline survey, $1.62 for the 15-min 1-month follow-up survey, $0.54 for the 5-min 2-month follow-up survey, and a $1.00 bonus for completing all three surveys. All participants were compensated the same amount for each survey they completed regardless of the actual amount of time it took them to complete it. The study was approved by the Institutional Review Board at Rutgers University, where the data were collected. This study was not preregistered. Data and study materials are available by request from the first author.

Participants

Following the baseline survey (N = 1,006), 214 individuals were excluded because of duplicate entries, failed attention checks, and/or not meeting eligibility criteria. This resulted in an analytic sample of 792 participants who ranged in age from 18 to 29 (M = 23.19, SD = 3.19). The sample was evenly split between gay/lesbian and bi+ participants; it included 340 cisgender men (42.9%), 334 cisgender women (42.2%), and 118 transgender/gender diverse individuals (14.9%). The transgender/gender diverse group included those who self-identified as nonbinary individuals (n = 50), transgender men (n = 28), transgender women (n = 18), genderqueer individuals (n = 6), gender nonconforming individuals (n = 5), women (n = 5), and individuals who wrote-in a gender identity that was not listed as a response option (e.g., questioning; n = 6). The racial/ethnic identities of participants were non-Latinx White (n = 488, 61.6%), Latinx (n = 97, 12.2%), Asian (n = 78, 9.8%), Black (n = 64, 8.1%), Biracial or Multiracial (n = 57, 7.2%), and a written-in race that was not listed as a response option (e.g., Middle Eastern and North African; n = 8, 1.0%). Race/ethnicity was dichotomized (non-Latinx White and people of color) because there were too few people in specific racial/ethnic minority groups for measurement invariance testing (Table 1).

Measures

Demographics

Participants self-reported age, sex assigned at birth, gender identity, sexual orientation, and race/ethnicity (described above).

Table 1 Results From Multigroup Measurement Invariance Testing Across Different Aspects of Identity

	Grouping											
	Sexual orientation (gay/lesbian vs. bi+)				Gender (cisgender men vs. cisgender women vs. transgender/gender diverse individuals)				Race/ethnicity (non-Latinx White vs. people of color)			
Fit index	Configural	Metric/weak	Scalar/strong	Strict	Configural	Metric/weak	Scalar/strong	Strict	Configural	Metric/weak	Scalar/strong	Strict
χ^2 (df)*	772.491 (176)	777.830 (189)	787.516 (202)	815.017 (219)	922.567 (264)	979.944 (290)	1040.216 (316)	1148.538 (350)	786.300 (176)	801.230 (189)	818.623 (202)	918.944 (219)
$\Delta\chi^2$ p	—	5.339	9.685	27.501	—	57.377	60.272	108.322	—	14.930	17.384	100.321
		p = .967	p = .720	p = .051		p < .001	p < .001	p < .001		p = .312	p = .182	p < .001
CFI	.936	.937	.937	.936	.930	.927	.923	.915	.934	.934	.933	.924
ΔCFI	—	+.001	0	−.001	—	−.003	−.004	−.008	—	0	−.001	−.009
RMSEA	.093	.089	.086	.083	.097	.095	.093	.093	.094	.090	.088	.090
ΔRMSEA	—	−.004	−.003	−.003	—	−.002	−.002	0	—	−.004	−.002	+.002
SRMR	.056	.057	.057	.059	.059	.066	.071	.078	.057	.060	.060	.071
ΔSRMR	—	+.001	0	+.002	—	+.007	+.005	+.007	—	+.003	0	+.011
Is MI tenable (Yes/No)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized mean squared residual; MI = measurement invariance; INQ = Interpersonal Needs Questionnaire. Consistent with specifications outlined in the creation and initial validation of the INQ-15 (Van Orden et al., 2012), two thwarted belongingness items ("I feel disconnected from other people" and "I often feel like an outsider at social gatherings") were allowed to covary due to their shared content related to social anxiety and social exclusion.

* *p* values were all <.001 for the overall model χ^2 tests

The Interpersonal Needs Questionnaire

The INQ-15 (Van Orden et al., 2012) is a 15-item measure of perceived burdensomeness (e.g., "These days, the people in my life would be better off if I were gone") and thwarted belongingness (e.g., "These days, I rarely connect with people who care about me"). Each item is rated on a 7-point scale (1 = not at all true for me, 7 = very true for me), and subscale scores are calculated by summing responses to the respective items (after necessary reverse scoring). Perceived burdensomeness and thwarted belongingness demonstrated excellent internal consistency (α = .94 and .92, respectively).

Analytic Plan

After examining item-level characteristics and determining that items were roughly normally distributed (see Table S1 in Supplemental Materials), all models were run using a maximum likelihood estimator (as opposed to an estimator robust to nonnormality) in Mplus Version 8.7. There were no missing data on the INQ-15, obviating the need for missing data techniques. Our main analyses consisted of running three different sets of multigroup measurement invariance models separately examining invariance using three dimensions of identity: sexual orientation (gay/lesbian or bi+), gender identity (cisgender man, cisgender woman, or transgender/gender diverse), and race/ethnicity (non-Latinx White or person of color). For each dimension of identity, we tested a configural model, where all parameters were freely estimated between groups, a metric (weak) invariance model, where factor loadings were constrained to equality between groups, a scalar (strong) invariance model, where factor loadings and item intercepts were constrained to equality between groups, and a strict model, where factor loadings, item intercepts, and residual variances were constrained to equality across groups. Invariance was tested for both subscales of the INQ-15 simultaneously, and, consistent with specifications outlined in the creation and initial validation of the INQ-15 (Van Orden et al., 2012), two thwarted belongingness items ("I feel disconnected from other people" and "I often feel like an outsider at social gatherings") were allowed to covary due to their shared content related to social anxiety and social exclusion.

Acceptable global model fit of the configural model was assessed via a comparative fit index (CFI) $\geq$ .90, a root-mean-square error of approximation (RMSEA) $\leq$ .08, and a standardized mean squared residual (SRMR) $\leq$ .08. We did not rely heavily on the chi-square ($\chi2$) value given its high sensitivity to sample size (Fan et al., 1999). Because the study's goal was to identify whether the INQ-15 as typically used demonstrated measurement invariance on different dimensions of identity, we did not make modifications to improve model fit besides the one residual covariance specified in the original validation study (Van Orden et al., 2012). After examining configural model fit, we compared the metric model fit against the configural model fit and subsequently compared the scalar model fit against the metric model fit. In comparing models, we did not rely heavily on $\chi2$ value differences because of its high sensitivity to sample size when testing measurement invariance (Meade et al., 2008). Instead, based on recommendations by Chen (2007), we relied on a combination of a ΔCFI $\leq$ .01 and a ΔRMSEA $\leq$ .015, as well as a ΔSRMR $\leq$ .03 when comparing metric models to baseline models and a ΔSRMR $\leq$ .015 when comparing scalar to metric models. The same criteria used for metric versus scalar model comparison were applied for scalar versus strict model comparisons. Model parameters (e.g., loadings, intercepts, residual variances, and factor variances) are reported in Tables S2–S4.

Finally, we compared latent means from the strict invariance models across groups to examine whether groups exhibited true, underlying differences in thwarted belongingness and perceived burdensomeness (results were identical when examining latent means derived from scalar models). In these models, the reference groups' (gay/lesbian, cisgender men, and non-Latinx White) latent means were set to 0 and the other groups' latent means were estimated relative to the reference group. Differences relative to the reference group were assessed using Z tests, and differences among nonreference groups (i.e., cisgender women vs. transgender/gender diverse participants) were assessed via Wald tests using the Model Test command in Mplus.

Results

Invariance by Sexual Orientation

We first examined multigroup measurement invariance based on sexual orientation. The configural model, where parameters were freely estimated across gay/lesbian participants (N = 396) and bi+ participants (N = 396), adequately fit the data despite a slightly elevated RMSEA, $\chi^2(176)$ = 772.491, p < .001, CFI = .936, RMSEA = .093, SRMR = .056. The metric model fit the data as well as the configural model (ΔCFI = +.001, ΔRMSEA = −.004, ΔSRMR = +.001). Additionally, the scalar model fit as well as the metric model (ΔCFI = 0, ΔRMSEA = −.003, ΔSRMR = 0). Finally, the strict model fit as well as the scalar model (ΔCFI = −.001, ΔRMSEA = −.003, ΔSRMR = +.002). Therefore, in our sample of sexual minority young adults, the INQ-15 met strict invariance between gay/lesbian participants and bi+ participants. Latent means between gay/lesbian and bi+ participants did not differ for either subscale (see Table S5).

Invariance by Gender Identity

Next, we tested for multigroup measurement invariance based on gender identity. The configural model, where parameters were freely estimated across cisgender men (N = 340), cisgender women (N = 334), and transgender/gender diverse individuals (N = 118), again adequately fit the data despite a slightly elevated RMSEA, $\chi^2(267)$ = 922.567, p < .001, CFI = .930, RMSEA = .097, SRMR = .066. Although the χ^2 difference test was significant, we judged the metric model to fit the data as well as the configural model (ΔCFI =−.003, ΔRMSEA = −.002, ΔSRMR = +.007). The scalar model fit as well as the metric model (ΔCFI = −.004, ΔRMSEA = −.002, ΔSRMR = +.005). Finally, the strict invariance model fit as well as the scalar model (ΔCFI = −.008, ΔRMSEA = 0, ΔSRMR = +.007). Therefore, the INQ-15 was determined to meet strict invariance between cisgender men, cisgender women, and transgender/gender diverse individuals. Groups did not differ in their underlying levels of thwarted belongingness, but transgender/gender diverse participants reported greater perceived burdensomeness than cisgender men (Z = 2.822, p = .005) and cisgender women (W = 5.363, p = .021).

Invariance by Race/Ethnicity

Finally, we tested for multigroup measurement invariance based on race/ethnicity. The configural model, where parameters were freely estimated across non-Latinx White participants (N = 488) and participants of color (N = 304), adequately fit the data despite a slightly elevated RMSEA, $\chi^2(176)$ = 786.300, p < .001, CFI = .934, RMSEA = .094, SRMR = .057. The metric model fit the data as well as the configural model (ΔCFI = 0, ΔRMSEA = −.004, ΔSRMR = +.003), and the scalar model fit as well as the metric model (ΔCFI = −.001, ΔRMSEA = +.002, ΔSRMR = 0). Finally, the strict invariance model fit as well as the scalar invariance model (ΔCFI = −.009, ΔRMSEA = +.002, ΔSRMR = +.011). Therefore, in our sample, the INQ-15 was determined to meet strict invariance between non-Latinx White participants and participants of color. Participants of color reported greater perceived burdensomeness (Z = 3.362, p = .001) and thwarted belongingness (Z = 3.319, p = .001) than non-Latinx White participants.

Sensitivity Checks

In the event of significant χ^2 difference tests comparing different levels of invariance, sensitivity checks were performed where the largest possible modifications at each level of invariance were identified. If these modifications would lead to a meaningful (greater than 10%) reduction in the χ^2, changes would be made and partial invariance would be assessed. However, no change at any level of invariance led to more than a 1.9% decrease in the χ^2 (see Supplemental Materials). Given the trivial changes in χ^2 that would result from these data-driven modifications, no modifications were made and the full strict invariance of the INQ-15 across all three dimensions of identity was reaffirmed.

Discussion

In our sample of sexual minority young adults, the INQ-15 was determined to meet strict invariance (i.e., equal factor loadings, item intercepts, and residual variances) across sexual orientation (gay/lesbian and bi+), gender identity (cisgender men, cisgender women, and transgender/gender diverse individuals), and race/ethnicity (non-Latinx White individuals and people of color). This indicates that the psychometric properties of the INQ-15 do not differ as a function of these demographic characteristics and, therefore, it can be used with confidence with diverse samples of sexual minority young adults. More specifically, our findings indicate that the factor structure of the INQ-15 holds across sexual orientation, gender identity, and racial/ethnic groups among sexual minority young adults (configural invariance), that scale items are equally correlated with their underlying factor (perceived burdensomeness or thwarted belongingness) across groups (weak/metric invariance), that individuals across groups with the same levels of perceived burdensomeness and thwarted belongingness do not differ in the level of endorsement of any scale items (strong/scalar invariance), and that the leftover variance in items unaccounted for by the underlying factors is also equal across groups (strict invariance).

Our findings also suggest that group differences in mean levels of perceived burdensomeness and thwarted belongingness found in prior studies are unlikely to be due to differences in the psychometric properties of the INQ-15. Consistent with prior research (Chang et al., 2021), we found that perceived burdensomeness was greater for transgender/gender diverse individuals than for cisgender men and women. However, Chang et al. (2021) also found that thwarted belongingness was greater for transgender/gender diverse individuals, which we did not. This difference may be due to the different ages of the samples (youth vs. young adults). As transgender/gender diverse youth become young adults, they may gain access to community support, thereby increasing feelings of belonging. We also found that perceived burdensomeness and thwarted belongingness were greater for participants of color than for non-Latinx White participants. However, it is difficult to compare these findings to prior studies because of differences in the ages of participants (Chang et al., 2021) and the operationalization of race/ethnicity (Pate & Anestis, 2020). Finally, we did not find differences between gay/lesbian and bi+ participants, which is consistent with some prior studies (Chang et al., 2021, 2022), but not others (Silva et al., 2015; Wolford-Clevenger et al., 2020). Although the current findings do not resolve the mixed evidence, they still suggest that group differences found in prior studies are unlikely to be due to differences in psychometric properties of the INQ-15. Additional research is needed to see if consistent patterns of results emerge across demographically similar samples.

It is important to note that while our findings are the first to examine measurement invariance of the INQ in a sample of sexual minority young adults, our findings of measurement invariance across multiple dimensions of identity align with other examinations of invariance of the INQ. For instance, in a sample of 539 youth, Hill et al. (2020) found that the 12-item version of the INQ demonstrated strong invariance across race/ethnicity (White, Black, and Latinx groups) and across male and female youth (gender identity was not reported). A majority of recent psychometric testing of the INQ has focused on measurement invariance across age groups (Lutz & Fiske, 2017), and the properties of translated versions of the scale (e.g., Lai & Boag, 2021, who assess the properties of the Chinese version of the INQ and test invariance across Chinese and Australian cultures). There is a need for researchers to continue to assess the invariance of the INQ across different populations, particularly those with high rates of suicide, such as sexual minority individuals (King et al., 2008), as better understanding of invariance, or lack thereof, helps increase the precision and validity with which we can link thwarted belongingness and perceived burdensomeness to suicidal thoughts and behaviors.

The current findings must be considered in light of several limitations. First, although our sample was relatively large (N = 792), we were unable to examine specific subgroups within our transgender/gender diverse group (e.g., transgender men, transgender women, nonbinary people) and our people of color group (e.g., Black, Latinx, Asian) because there were too few participants in each subgroup for measurement invariance testing. Studies with larger samples or targeted enrollment of particular groups may be able to assess invariance for those with multiple, intersectional minoritized identities, either by treating each intersection as its own group (e.g., Black transgender women) or by employing newer procedures that allow one to simultaneously test for invariance among multiple categorical and continuous variables and their interactions

(Bauer, 2017; Curran et al., 2014). Second, given that our sample was comprised of young adults, we were unable to examine invariance based on age. Prior studies have demonstrated that the INQ exhibited invariance across age groups (Lutz & Fiske, 2017; Van Orden et al., 2012), but it will be important to replicate this in a sexual minority sample. Third, there are several versions of the INQ and our findings are specific to the 15-item version. We cannot draw conclusions about the measurement invariance of other versions, but we suspect our findings would replicate given that the versions are highly correlated. Limitations aside, the results of the present study provide support for the measurement invariance of the INQ-15 across sexual orientation, gender identity, and race/ethnicity in a sample of sexual minority young adults. This indicates that its psychometric properties do not differ as a function of these demographics and, therefore, scores can be used with and compared among diverse samples of sexual minority young adults.

Footnotes

1 Five participants identified as women and reported being assigned male at birth. As such, they were included in the transgender/gender diverse group.

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