



HHS Public Access

Author manuscript

J Affect Disord Rep. Author manuscript; available in PMC 2023 July 01.

Published in final edited form as:

J Affect Disord Rep. 2023 July ; 13: . doi:10.1016/j.jadr.2023.100608.

Bisexual-specific minority stress in nonsuicidal self-injury: The mediating role of perceived burdensomeness

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Abstract

Background: Bisexual-identifying individuals are at heightened risk for engaging in non-suicidal self-injury (NSSI), with the odds up to six times higher compared to heterosexual individuals and up to four times higher compared to lesbian/gay (L/G) individuals. While research has established that sexual minorities may be at increased risk because minority stressors exacerbate psychological processes associated with NSSI, little research has examined bisexual-specific pathways of risk. In this study, we replicated findings that suggest Interpersonal Theory of Suicide (IPTs) variables (i.e., perceived burdensomeness and thwarted belongingness) mediate the association between minority stress and NSSI and extended these findings by examining whether such mediation is moderated by sexual minority identity. Furthermore, we explored whether IPTs variables mediate the association between bisexual-specific minority stress and NSSI.

Method: A sample of 259 cisgender L/G ($n = 93$) and bisexual ($n = 166$) MTurk workers completed measures assessing minority stress, NSSI, and IPTs variables.

Results: Mediation analyses replicated findings that experiences of minority stress increase NSSI by increasing perceived burdensomeness [PB], though moderated mediation analyses failed to provide evidence that sexual minority identity moderated this indirect effect. Rather, minority stress from both heterosexual and L/G individuals increased NSSI through increased PB for bisexual individuals.

Limitations: The use of cross-sectional data does not allow conclusions of causal relationships.

Conclusions: These results suggest that for bisexual individuals, minority stress from both heterosexual and L/G individuals increases NSSI by increasing PB. Future researchers and clinicians should consider the additive burden of minority stress in bisexual individuals.

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CRedit authorship contribution statement

Rachael E. Dumas: Conceptualization, Methodology, Investigation, Project administration, Data curation, Formal analysis, Writing – original draft. **Carolyn M. Pepper:** Conceptualization, Methodology, Funding acquisition, Resources, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Keywords

NSSI; Minority stress; Bisexual; Interpersonal theory of suicide; Perceived burdensomeness

1. Introduction

Non-suicidal self-injury (NSSI) is the deliberate, self-inflicted destruction of body tissue without suicidal intent (Klonsky, 2007). NSSI represents a significant public health concern, with the lifetime prevalence of NSSI estimated to be 17–18% in young people (International Society for the Study of Self-Injury, 2018) and 5.9% in adults (Klonsky, 2011). Sexual minority (LGBQ) individuals consistently report higher rates of NSSI compared to heterosexual individuals (Batejan et al., 2015; Liu et al., 2019), with lifetime prevalence rates estimated to be nearly 30% (Liu et al., 2019). Similarly, sexual minority individuals are two to four times more likely than heterosexual individuals to have attempted suicide in their lifetime (Haas et al., 2010; Marshal et al., 2011). Notably, bisexual-identifying individuals are at greater risk for both NSSI and suicide attempts compared to their lesbian and gay counterparts (Gnan et al., 2019; Liu et al., 2019). Overall, the odds of engaging in NSSI are up to six times higher and the odds of having attempted suicide are up to five times higher in bisexual individuals compared to other sexualities (Dunlop et al., 2020; Salway et al., 2019). Despite this heightened risk, little research has investigated risk factors for NSSI in bisexual individuals.

One model that guides research in sexual minority risk for NSSI is Minority Stress Theory (MST; Meyer 2003). MST postulates that various mental health concerns result from the unique stressors faced by sexual minority individuals (e.g., internalized homophobia, fear of coming out, discrimination). These stressors (i.e., minority stress), and expectations that these events will continue to occur, are thought to contribute to the high prevalence of mental health concerns like NSSI in sexual minority individuals.

MST may also be useful in understanding increased risk for NSSI in bisexual individuals compared to gay/lesbian individuals. Notably, bisexual individuals may experience stressors that are unique, even within the LGBQ community. Due to the binary view of sexual orientation (i.e., “individuals are either heterosexual or homosexual”), those with bisexual identities are often perceived as having unstable and illegitimate sexual orientations (Davila et al., 2019; Mitchell et al., 2015; Mohr and Rochlen, 1999). Moreover, they often experience discrimination from both heterosexual and LGQ individuals (Brewster and Moradi, 2010; Mitchell et al., 2015; Mohr and Rochlen, 1999; Paul et al., 2014). This bisexual-specific minority stress has been associated with poorer health outcomes beyond the effects of general sexual minority stress (Katz-Wise et al., 2017), as well as increased risk for depression and anxiety (Chan et al., 2020).

An extension of MST links minority stressors to adverse mental health outcomes like NSSI through altered emotion regulation, interpersonal, and cognitive processes (Hatzenbuehler, 2009). One theoretical model that explains psychological processes that may increase risk for NSSI is The Interpersonal Theory of Suicide (IPT; Joiner 2005). IPTS was originally developed to explain suicide risk, positing that individuals who experience thwarted

belongingness, perceived burdensomeness, and acquired capability for suicide through lowered fear of death and elevated tolerance for pain are at highest risk for death by suicide (Joiner, 2005; Van Orden et al., 2010). This model has also demonstrated applicability to NSSI, as its relationship to suicide is particularly strong—second only to suicide ideation—and the problems that exacerbate suicidal desire (i.e., perceived burdensomeness and thwarted belongingness) may also exacerbate the perceived need for NSSI (Joiner et al., 2012).

This integration of MST and IPTS has been used by researchers to better understand elevated rates of NSSI in sexual minority individuals. Research with sexual minority individuals has provided evidence for this hypothesized process through perceived burdensomeness when using depression and suicide ideation as outcomes (Baams et al., 2015; Hill and Pettit, 2012). Furthermore, in an explicit test of theoretical integration in a sample of sexual minority college students, Muehlenkamp et al. (2015) found that perceived burdensomeness mediated the relationship between minority stress and NSSI. This integration of MST and IPTS may highlight a potential mechanism for risk for NSSI within cis-gender bisexual individuals. That is, at similar levels of minority stress, bisexual individuals may experience higher levels of perceived burdensomeness compared to their lesbian and gay counterparts, thus explaining their higher rates of NSSI. Though Muehlenkamp et al. (2015) found no evidence for thwarted belongingness as a mechanism of risk in sexual minority NSSI, it may be an important variable for bisexual individuals given that they are likely to experience discrimination from both heterosexual individuals and the larger LGQ community (Brewster and Moradi, 2010; Mitchell et al., 2015; Mohr and Rochlen, 1999).

The current study aimed to replicate mediational findings that integrate MST and IPTS to explain risk for NSSI among sexual minorities and to extend these findings by examining whether identifying as bisexual strengthens the relationship between minority stress and IPTS variables (i.e., perceived burdensomeness and thwarted belongingness). Furthermore, the current study aimed to explore the role of bisexual-specific stressors within an integrated model of MST and IPTS. Our hypotheses were that 1) bisexual participants would experience increased perceived burdensomeness and thwarted belongingness compared to lesbian/gay participants at similar levels of minority stress and 2) bisexual-specific minority stress perpetrated by both heterosexual and lesbian/gay individuals would increase NSSI severity through perceived burdensomeness and thwarted belongingness for bisexual participants.

2. Method

2.1. Participants

Data were collected as part of a larger internet-based survey of sexual identity, minority stress, NSSI, and suicidal thoughts and behaviors ($N = 506$). Sexual minority participants were recruited through Amazon Mechanical Turk (MTurk) if they were over the age of 18 and located in the United States. The sample for the current study ($n = 259$) included cisgender lesbian ($n = 43$), cisgender gay ($n = 50$), and cisgender bisexual ($n = 166$; 76.5% cisgender women) individuals.

2.2. Measures

2.2.1. Demographics—Demographic information was collected on age, sex assigned at birth, current sex identification, pronouns, gender identity, sexual minority identity (straight/heterosexual, asexual, bisexual, gay, lesbian, pansexual, queer, questioning, same gender loving), socioeconomic status (SES), and racial/ethnic identity.

2.2.2. The interpersonal needs questionnaire (INQ; Van Orden et al. 2012)—The INQ was used to measure perceived burdensomeness and thwarted belongingness. The INQ consists of 10 items designed to measure the extent to which participants feel like a burden to significant individuals in their lives (5 items; e.g., “These days, the people in my life would be better off if I were gone”) and the extent to which participants feel disconnected from others (5 items; e.g., “These days, I often feel like an outsider in social gatherings”). Participants rated each statement on a seven-point scale (1 = not at all true for me, 4 = somewhat true for me, 7 = very true for me). Research from diverse samples has supported the reliability (i.e., internal consistency and inter-rater reliability) and convergent validity of these subscales (Van Orden et al., 2012). Analyses from the current sample indicated high levels of internal consistency for both the burdensomeness ($\alpha = .96$) and the belongingness ($\alpha = .92$) subscales.

2.2.3. Minority stress scale (MSS; Norcini Pala et al. 2017)—The MSS, a 43-item instrument designed to assess a variety of manifestations of sexual orientation stigma (e.g., homophobic discrimination and physical aggression) was used to measure experiences of minority stress associated with identifying as a sexual minority. The MSS was originally developed for gay and bisexual men. The current study revised the language of the items to be inclusive of cisgender lesbian and bisexual women. The MSS contains eight subscales: Structural Stigma, Enacted Stigma, Expectations of Discrimination, Expectations of Discrimination from Family Members, Sexual Orientation Concealment, Internalized Homophobia toward Others, Internalized Homophobia Toward Oneself, and Stigma Awareness. Participants rate items on a 5-point rating scale (1 = completely disagree, 5 = completely agree; 1 = never, 5 = always) or on a dichotomous scale (no = 0, yes = 1). For the current study, items that are rated on dichotomous scales were revised to a 5-point rating scale to standardize measurements across subscales. All subscales were summed and averaged, and the averages were then summed and averaged to create a total score. Correlations with scores from the brief version of the Perceived Stress Questionnaire from prior research provide evidence for convergent validity (Norcini Pala et al., 2017). The summary score calculated for the current study demonstrated high internal consistency ($\alpha = .91$).

2.2.4. Anti-bisexual experiences scale (ABES; Brewster and Moradi 2010)—The ABES was used to quantify the extent to which cisgender bisexual individuals experience discrimination from both heterosexual and lesbian/gay individuals. The ABES consists of 17 items and includes three subscales: Sexual Orientation Instability (e.g., “People have addressed my bisexuality as if it means that I am simply confused about my sexual orientation”), Sexual Irresponsibility (e.g., “People have treated me as if I am obsessed with sex because I am bisexual”), Interpersonal Hostility (e.g., “Others have

treated me negatively because I am bisexual”). Respondents were asked to respond to each item twice: once to assess their experiences of anti-bisexual prejudice from heterosexual individuals and then again to capture their experiences of anti-bisexual prejudice from lesbian/gay individuals. Participants responded to items using a 6-point scale assessing the frequency of each identified experience (1 = never to 6 = almost all of the time). Responses from the 17 items were added to produce total scores with higher scores indicating greater prejudice. Previous research found acceptable internal consistency ($\alpha = .81-.94$), convergent validity (i.e., with stigma consciousness, $r = .37-.54$; with awareness of public devaluation, $r = .28-.41$), and discriminant validity (i.e., with impression management, $r = -.00-.09$; Brewster and Moradi 2010). Reliability analyses from the current sample demonstrated high internal consistency for scales assessing anti-bisexual prejudice from lesbian/gay individuals ($\alpha = .95$) and from heterosexual individuals ($\alpha = .96$).

2.2.5. Inventory of statements about self-injury (ISAS; Klonsky and Glenn 2009)—The ISAS was used to assess the severity of NSSI behaviors. The ISAS consists of two sections that assess the lifetime frequency of 18 NSSI behaviors and 13 potential functions of NSSI. Participants estimated the number of times they have performed each behavior and rated the relevance of each provided function (0 = not relevant, 1 = somewhat relevant, 2 = very relevant). NSSI frequency was assessed by adding the total number of behaviors endorsed. NSSI severity was assessed by the number of lifetime NSSI behaviors (i.e., methods) used with values ranging from 0 to 18. Prior research demonstrates that the ISAS correlates with expected clinical constructs (e.g., borderline personality disorder, suicidality, depression) and contextual variables (e.g., tendency to self-injure alone).

2.3. Procedures

IRB approval for the current study was submitted under exempt status given that responses were anonymous, and participation involved minimal risk. Cisgender lesbian, gay, and bisexual individuals were recruited on MTurk, where they chose our study from a list of studies. If eligible (i.e., indicated that they were cisgender lesbian, cisgender gay, or bisexual and at least 18 years old), they were directed to a Qualtrics link. Participants immediately completed an online informed consent form. Participants were paid eight U.S. dollars to complete the 60 min survey. The study included a CAPTCHA to reduce bot responding as well as 28 attention check items to assess the validity of participants' responses. Following completion of the questionnaires, participants navigated to a debriefing page that provided links to resources for sexual minority individuals seeking treatment for suicidality and NSSI.

Participants were excluded after data collection if they failed more than two attention checks ($n = 14$), did not complete sexual orientation data ($n = 15$), reported multiple, potentially “conflicting” sexual orientations (e.g., heterosexual and gay; $n = 23$), or had more than 30% missingness in their questionnaire responses ($n = 21$). Participants who selected multiple sexual orientation identities were recoded into lesbian ($n = 2$), gay ($n = 2$), and bisexual ($n = 27$) identities if the selected identities did not appear to conflict with one another (e.g., lesbian and queer). Finally, participants were excluded from the current sample if they reported a gender identity other than cisgender (e.g., non-binary, transgender) and/or a sexual orientation other than lesbian, gay, or bisexual (e.g., pansexual).

The remaining missing data were determined to be missing completely at random through a missing values analysis. Therefore, missing data points were imputed using mean substitution for homogenous scales. All values were determined to be within plausible bounds for each measure, skew and kurtosis were within acceptable limits, and no cases were identified as univariate or multivariate outliers.

2.4. Data analysis plan

All data were analyzed using the Statistical Package for Social Sciences (SPSS25).

2.4.1. Mediation—Three mediational analyzes were conducted between experiences of minority stress and IPTS variables, the first using reports of general minority stress for the full sample (i.e., MSS), the second using reports of bisexual-specific minority stress from gay and lesbian individuals (i.e., ABES), and the third using reports of bisexual-specific minority stress from heterosexual individuals (i.e., ABES) as initial variables. For all analyzes, NSSI severity was the primary outcome variable and thwarted belongingness and perceived burdensomeness scores were the mediational variables. Mediational analyzes were conducted using Preacher and Hayes' PROCESS macro for SPSS (Preacher and Hayes 2008; Model 4). A bootstrapped 95% bias corrected and accelerated confidence interval (5000 resamples) was provided for each indirect effect based on an a priori specified number of bootstrapped replications. Beta weights reported represent standardized values.

2.4.2. Moderated mediation—Analyses of indirect effects were conducted using SPSS macros for moderated mediation (i.e., conditional indirect effects; Model 7; Preacher et al. 2007). All tests were two-tailed, alpha was set at .05, and bootstrapped 95% bias corrected and accelerated confidence intervals (5000 resamples) for the indirect effect were generated. For the current study, the indirect effect of minority stress on NSSI frequency via perceived burdensomeness and thwarted belongingness scores was estimated when different sexual minority identities were present (i.e., a combined group of cisgender lesbian and cisgender gay identities, and a separate group of bisexual identities). Beta weights reported in the moderated mediation model represent unstandardized values.

2.4.3. A priori power analysis—Power analyses were conducted for the mediational models. Given the paucity of research on how these variables are related, power analyses were structured to determine the sample necessary to detect both a small (0.14) and moderate (0.26) effect for path α (the relation between the predictor variable and the intervening variable) and a moderate (0.26) and medium (0.39) effect for path β (the relation between the intervening variable and the outcome variable). Assuming a small effect for path α and a moderate path β , a sample of 377 is recommended to achieve adequate power for the test of indirect effect. Assuming a moderate effect for path α and a medium effect for path β , a sample of 115 is recommended to achieve adequate power for the test of indirect effect (Fritz and MacKinnon, 2007). The midpoint of these two estimations yields a sample size of 246, indicating a total sample of cisgender lesbian, gay, and bisexual individuals that would likely be adequately powered to detect even small effects. A total sample of $N = 259$ was collected (93 cisgender lesbian and gay individuals and 166 bisexual individuals), which was deemed acceptable, albeit underpowered, to analyze group differences.

3. Results

3.1. Demographic and clinical analyzes

The sample for the current study was taken from a larger, internet-based study on sexual identity, minority stress, NSSI, and suicidal thoughts and behaviors ($N = 506$). The current study included only participants who met gender and sexual orientation criteria (i.e., cisgender, lesbian, gay, and bisexual individuals; $n = 259$). The analytic sample was 35.9% lesbian ($n = 43$) and gay ($n = 50$) individuals and 64.1% bisexual individuals ($n = 166$; 39 cisgender men, 127 cisgender women). Age of participants ranged from 19 to 66 ($M = 36.76$, $SD = 10.92$). On average, lesbian and gay participants ($M = 40.0$, $SD = 13.10$) were older ($t(141.77) = -3.31$, $p = 0.001$) than bisexual participants ($M = 34.95$, $SD = 9.02$). Racially, 72.2% ($n = 187$) of the respondents were White, 10.0% ($n = 26$) were Black or African American, 7.7% ($n = 20$) were of Spanish origin or Hispanic/Latinx, 4.6% ($n = 12$) were Multiracial, 3.9% ($n = 10$) were Asian, 0.8% were Native American or Alaska Native ($n = 2$), and 0.8% ($n = 2$) were Middle Eastern or North African. The proportion of participants who were White did not differ meaningfully between bisexual and lesbian/gay participants ($\chi^2(1, N = 259) = 0.061$, $p = 0.805$; see Table 1).

3.1.1. Prevalence and severity of NSSI—Overall, 65.6% ($n = 170$) of the sample reported ever engaging in NSSI behaviors in their lifetime. Within groups, 69.9% of the lesbian/gay participants (55.4% cisgender women) and 63.3% of the bisexual participants (80.0% cisgender women) reported ever engaging in NSSI behaviors. The proportion of participants who reported engaging in NSSI did not differ meaningfully between bisexual and lesbian/gay participants ($\chi^2(1, N = 259) = 1.165$, $p = 0.280$).

NSSI severity analyzes revealed that the mean number of methods used across groups was 3.98 ($SD = 4.27$). There were no significant differences in the mean number of methods used ($t(233.45) = 1.578$, $p = 0.116$), between bisexual individuals ($M = 4.27$, $SD = 4.62$) and lesbian/gay individuals ($M = 3.46$, $SD = 3.53$).

3.1.2. IPTS Variables—On average, bisexual individuals reported experiencing more perceived burdensomeness ($M = 12.40$, $SD = 8.66$) than did lesbian/gay individuals ($M = 9.45$, $SD = 6.65$; $t(232.729) = 3.07$, $p = 0.002$). Bisexual ($M = 20.56$, $SD = 8.59$) and lesbian/gay individuals ($M = 20.56$, $SD = 9.28$) reported comparable levels of thwarted belongingness ($t(257) = 0.001$, $p = 1.00$).

3.1.3. Minority stress variables—On average, bisexual ($M = 1.86$, $SD = 0.54$) and lesbian/gay ($M = 1.94$, $SD = 0.48$) individuals reported experiencing similar levels of minority stress ($t(257) = -1.268$, $p = 0.206$). Within the bisexual subsample, cisgender men and women reported comparable levels of bisexual-specific minority stress from both heterosexual individuals ($t(164) = -0.180$, $p = 0.857$) and lesbian/gay individuals ($t(163) = 0.211$, $p = 0.833$).

3.2. Full sample hypotheses

3.2.1. Mediation replication (Table 2)—To evaluate the hypothesis that minority stress predicted NSSI severity via the mediating role of perceived burdensomeness and thwarted belongingness, a model was specified with two mediators ($F(3, 255) = 23.35, p < .001, R^2 = 0.216$). Using the full sample, minority stress significantly predicted perceived burdensomeness (path $a_1; b = 0.43, p < .001$), thwarted belongingness (path $a_2; b = 0.25, p < .001$), and NSSI (path $c; b = 0.11, p < .001$). At average levels of minority stress ($M = 1.888$), the relation between perceived burdensomeness and NSSI severity was significant (path $b_1; b = 0.30, p < .001$); however, the relation between thwarted belongingness and NSSI severity was not significant (path $b_2; b = -0.06, p = 0.31$). At average levels of perceived burdensomeness ($M = 11.34$) and thwarted belongingness ($M = 20.56$), the direct effect between minority stress and NSSI severity was also significant (path $c'; b = 0.27, p < .001$). The percentile bootstrap confidence interval examining the indirect effect of minority stress on NSSI severity through perceived burdensomeness did not contain zero ($ab_1 = 0.13, 95\% \text{ CI } [0.05-0.22]$), suggesting a partial mediating effect of minority stress on NSSI severity through perceived burdensomeness.

3.2.2. Moderated mediation extension (Fig. 1; Table 3)—To evaluate the hypothesis that minority stress predicted NSSI severity via the mediating role of perceived burdensomeness and thwarted belongingness conditionally based on sexual minority identity (i.e., bisexual vs. lesbian/gay), a model was specified with two mediators and a moderator. Full results for the conditional process model are provided in Table 3. The full model explained 21.6% of the variance in NSSI severity ($R^2 = 0.216, F(3, 255) = 23.35, p < .001$). Reporting higher minority stress predicted higher perceived burdensomeness ($b = 7.37, p < .001$) but did not significantly predict thwarted belongingness ($b = 1.90, p = 0.12$). The interaction between minority stress and sexual minority identity was significant for thwarted belongingness ($b = 7.84, p < .001$) but not for perceived burdensomeness ($b = -1.49, p = 0.42$), indicating that sexual minority identity moderated the relation between minority stress and thwarted belongingness. The conditional effect of minority stress on thwarted belongingness indicated a significant, positive relationship for lesbian/gay individuals ($b = 9.74, p < .001$).

The confidence intervals for the conditional indirect effect of sexual minority identity contained zero for both perceived burdensomeness (95% CI $[-0.86-0.34]$) and thwarted belongingness (95% CI $[-0.85-0.30]$). Thus, there were no statistically meaningful differences between the indirect effects observed for lesbian/gay individuals and bisexual individuals for either perceived burdensomeness ($ab = 0.94, 95\% \text{ CI } [0.33-1.76]$; $ab = 1.18, 95\% \text{ CI } [0.48-2.04]$, respectively) or thwarted belongingness ($ab = -0.30, 95\% \text{ CI } [-1.01-0.38]$; $ab = -0.06, 95\% \text{ CI } [-0.29-0.08]$, respectively), suggesting no evidence of moderated mediation (Fig. 1).

3.3. Bisexual-specific hypotheses

3.3.1. Heterosexual bisexual-specific minority stress (Fig. 2; Table 4)—To evaluate the relationship between experiences of bisexual-specific minority stress from the heterosexual community and NSSI severity through perceived burdensomeness and thwarted

belongingness, a model was specified with two mediators ($F(1, 164) = 10.23, p = .002, R^2 = 0.059$). More experiences of bisexual-specific minority stress from the heterosexual community predicted higher perceived burdensomeness (path $a_1; b = 0.27, p < .001$), higher thwarted belongingness (path $a_2; b = 0.16, p = 0.04$) and increased NSSI severity (path $c; b = 0.24, p = .002$). At average levels of bisexual-specific minority stress from heterosexual individuals ($M = 2.642$), the relation between perceived burdensomeness and NSSI severity was significant (path $b_1; b = 0.42, p < .001$), though the relation between thwarted belongingness and NSSI severity was not (path $b_2; b = -0.14, p = .07$). At average levels of perceived burdensomeness ($M = 12.40$) and thwarted belongingness ($M = 20.56$), the direct effect between heterosexual minority stress and NSSI was significant (path $c'; b = 0.15, p = .04$). The percentile bootstrap confidence interval examining the indirect effect of bisexual-specific minority stress from heterosexual individuals on NSSI severity through perceived burdensomeness contained zero ($ab_1 = 0.11, 95\% \text{ CI } [0.02-0.18]$), providing evidence for a partial mediating effect of bisexual-specific minority stress from heterosexual individuals on NSSI severity through perceived burdensomeness (Fig. 2).

3.3.2. Lesbian/gay bisexual-specific minority stress (Fig. 2; Table 4)—To evaluate the relationship between experiences of bisexual-specific minority stress from lesbian/gay individuals and NSSI severity through perceived burdensomeness in the bisexual sample, a model was specified with two mediators ($F(1, 163) = 13.14, p < .001, R^2 = 0.075$). More experiences of bisexual-specific minority stress from lesbian/gay individuals predicted higher perceived burdensomeness (path $a_1; b = 0.24, p = .002$) and higher NSSI (path $c; b = 0.27, p < .001$) but not higher thwarted belongingness (path $a_2; b = 0.12, p = .16$). At average levels of lesbian/gay minority stress ($M = 2.298$), the relation between perceived burdensomeness and NSSI severity was significant (path $b_1; b = 0.350, p < .001$), though the relation between thwarted belongingness and NSSI was not (path $b_2; b = -0.14, p = .08$). At average levels of perceived burdensomeness ($M = 12.40$) and thwarted belongingness ($M = 20.56$), the direct effect between bisexual-specific minority stress from lesbian/gay individuals and NSSI severity was significant (path $c'; b = 0.189, p = .011$). The standardized bootstrap confidence interval examining the indirect effect of bisexual-specific minority stress from lesbian/gay individuals on NSSI severity through perceived burdensomeness did not contain zero ($ab = 0.10, 95\% \text{ CI } [0.02-0.20]$), providing evidence for a partial mediating effect of lesbian/gay minority stress on NSSI severity through perceived burdensomeness (Fig. 2).

4. Discussion

We examined NSSI severity among sexual minority individuals through testing integrated hypotheses related to MST and IPTS. We found support for our hypotheses surrounding the role of perceived burdensomeness in explaining the relationship between minority stress and NSSI severity in sexual minority individuals. Moreover, in our bisexual subsample, we found evidence that perceived burdensomeness can explain the relationship between bisexual-specific stress from both heterosexual and LG individuals and NSSI severity.

Using Hatzenbuehler's (2009) extension of MST and IPTS variables, our analyses revealed that minority stress predicted increased NSSI severity through perceived burdensomeness,

but not thwarted belongingness, for our full sample of cisgender lesbian, gay, and bisexual individuals. These findings replicate those from Muehlenkamp et al. (2015), who found that perceived burdensomeness partially mediated the relation between minority stressors and NSSI. Ultimately, findings from the current study add to the growing literature that finds that perceived burdensomeness plays a central role in risk processes for poor mental health outcomes among sexual minority individuals (e.g., Baams et al. 2015; Chang et al. 2022; Fulginiti et al. 2020; Hill and Pettit 2012).

Despite the findings that link minority stress to NSSI severity via perceived burdensomeness in our full sample, we found no evidence to support our hypothesis that identifying as bisexual would strengthen this indirect relationship. These findings suggest that the increased prevalence of NSSI observed among bisexual individuals compared to lesbian and gay individuals may not be explained by exacerbated relationships between minority stress, perceived burdensomeness and NSSI, even with findings that bisexual participants reported significantly more perceived burdensomeness than lesbian and gay participants.

This finding may have been explained by similar rates of lifetime NSSI reported by the bisexual and lesbian/gay groups. Contrary to established epidemiological findings, our bisexual subsample did not report higher rates of lifetime NSSI compared to our lesbian/gay subsample, which may have limited our ability to detect hypothesized differences between our bisexual and lesbian/gay groups. Notably, results from the current study revealed strikingly high prevalence of NSSI in both bisexual and lesbian/gay groups — with nearly 70% of our lesbian/gay group and approximately 63% of our bisexual group reporting lifetime NSSI. One study revealed that MTurk workers were over twice as likely to screen positive for depression relative to the national sample (Walters et al., 2018), which may suggest that MTurk workers are more likely to report mental health concerns relative to other samples. Thus, it is possible that the lack of group differences in NSSI stems from sampling a particularly at-risk group of lesbian and gay participants, perhaps obscuring potential differences in our mediation effects.

Interestingly, results from the bisexual sub-sample suggest that perceived burdensomeness explained the relationship between minority stress from both heterosexual and LG individuals and NSSI severity. These findings provide preliminary empirical evidence that bisexual individuals may experience an additional burden of minority stress from LG individuals, which may trigger the mechanisms that influence the perceived need for NSSI in bisexual individuals more frequently than for lesbian/gay individuals. These findings are consistent with others that suggest bisexual individuals are likely to experience discrimination from both heterosexual and lesbian/gay individuals (Brewster and Moradi, 2010; Mitchell et al., 2015; Mohr and Rochlen, 1999; Paul et al., 2014). Further research is needed to establish how risk for NSSI in bisexual individuals may be exacerbated by experiencing minority stress from both heterosexual individuals and members of the LG community and whether these stressors are associated with risk for NSSI beyond the effects of general minority stress.

We found no evidence for the role of thwarted belongingness in either general or bisexual specific minority stress. These findings are consistent with literature that suggests that

perceived burdensomeness is a more robust predictor of risk for self-injurious behaviors in both general populations (Ma et al., 2016) and among sexual minority populations (e.g., Hill and Pettit 2012; Silva et al. 2015). Nevertheless, some research has found that thwarted belongingness is associated with minority stress (Fulginiti et al., 2020; Muehlenkamp et al., 2015). A recent longitudinal study examining an integration of MST and IPTS found that for a sample of lesbian, gay, and bisexual individuals, minority stress outcomes at baseline were significantly associated with suicide ideation at a one-month follow-up via thwarted belongingness (Chang et al., 2022). Furthermore, research in bisexual populations suggests that week-by-week fluctuations in thwarted belongingness, rather than average levels, may be linked to NSSI (Dunlop et al., 2022). Thus, thwarted belongingness may have a more proximal relationship to experiences of minority stress and NSSI—a relationship that would not be revealed within analyses of our retrospective, cross-sectional data.

5. Strengths, limitations, and future directions

These findings must be interpreted in the context of important limitations. Our study was likely significantly underpowered for our analyzes, including our moderated mediation analysis and the mediation analyses within the bisexual sub-sample. However, our study represents a sizable sample of understudied and underrepresented groups and was adequately sized to analyze differences between specific sexual minority identities. Nonetheless, our study excluded many identities, including gender minority individuals that may represent additional patterns of risk resulting from intersecting identities. Additionally, our sample included a large proportion of White participants, and our bisexual subsample was dominated by cisgender women—limiting generalizability to NSSI processes within other minoritized identities (e.g., racial minorities) and cisgender bisexual men. However, our sample also represented an age group not typically represented within this literature—with most studies focusing on adolescent, young adult, and college age participants. In addition, our data are both retrospective and cross-sectional, which do not allow for assessments of temporal relationships (as in the relationship between minority stress and IPTS variables) or causality and are likely subject to recall bias.

Specific avenues for research as implicated by our findings include assessing the processes involved from experiencing minority stress from both heterosexual and LG individuals. Furthermore, researchers should consider prospective and ecological momentary assessment (EMA) studies to closely track NSSI and IPTS variables following the experience of minority stressors, including bisexual-specific minority stressors.

6. Conclusions

Results of the current study suggest that perceived burdensomeness is important in explaining the relationship between bisexual-specific minority stress and NSSI severity. Moreover, bisexual-specific minority stress increases perceived burdensomeness for these individuals when it comes from both heterosexual and lesbian/gay individuals. Future researchers should continue to explore the unique context and influence of bisexual-specific minority stressors in increasing risk for NSSI among bisexual individuals.

Acknowledgments

We thank those who took the time to participate in this study. We also thank Dr. Josh Clapp for his assistance with power analyses.

Role of the funding source

RD was supported by a grant from the National Institute of General Medical Sciences (P20GM103432) from the National Institutes of Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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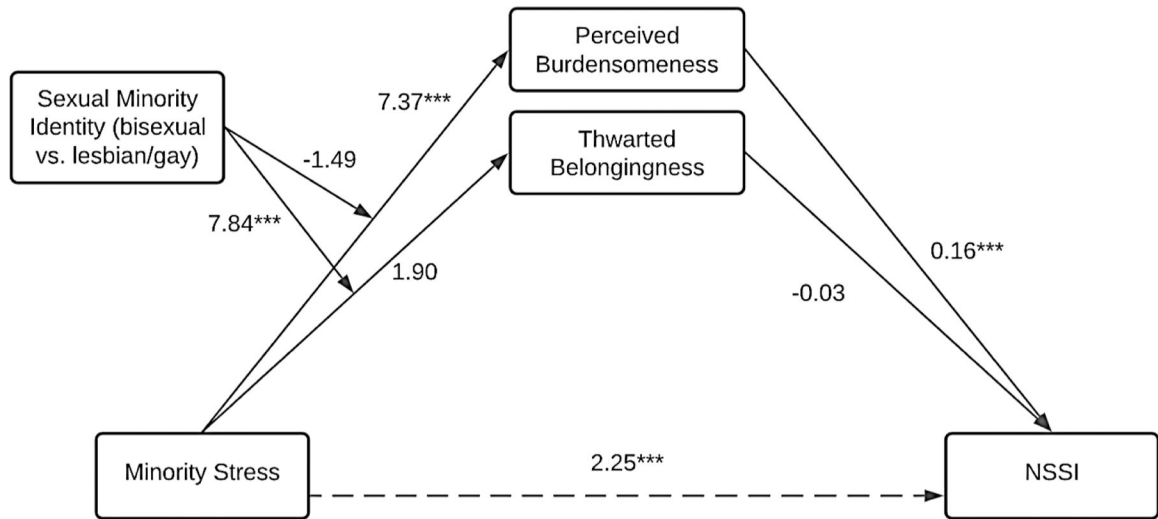


Fig. 1. Moderated Mediation of Minority Stress and IPTS. Numerical values represent unstandardized beta weights. Dotted lines indicate direct effects. * $p < .05$, ** $p < .01$, and *** $p < .001$.

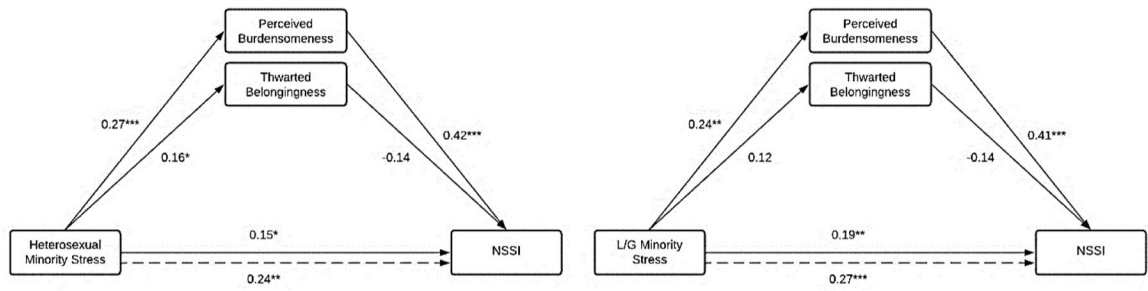


Fig. 2. Bisexual-Specific Minority Stress and IPTS Mediation. Numerical values represent standardized beta weights. Solid lines indicate direct effects and dotted lines indicate total effects. * $p < .05$, ** $p < .01$, and *** $p < .001$.

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Table 1

Demographics and preliminary means-based comparisons across bisexual and lesbian/gay (L/G) groups.

Variable	Cisgender Bisexual (<i>n</i> = 166)	Cisgender L/G (<i>n</i> = 93)	Statistic	<i>p</i>
n, % Cisgender Women	127, 76.5%	43, 46.2%	$\chi^2(1, N=259) = 24.21$	<i>p</i> .001
Age (M ± SD)	34.95 ± 9.02	40.00 ± 13.10	$t(141.77) = -3.31$	<i>p</i> = 0.001
Race/Ethnicity (n, %)			$\chi^2(1, N=259) = 0.06$	<i>p</i> = 0.805
White (ref. chi-square)	119, 71.7%	68, 73.1%		
Black/African American	19, 11.4%	7, 7.5%		
Spanish Origin/Hispanic/Latinx	11, 6.6%	9, 9.7%		
Asian	5, 3.0%	5, 5.4%		
Native American/Alaska Native	2, 1.2%	N/A		
Middle Eastern/North African	1, 0.6%	1, 1.1%		
Multiracial	9, 5.4%	3, 3.2%		
Education Level (median)	College education	College education	$U(N_{\text{bisexual}} = 166, N_{\text{LG}} = 93) = 7145.50, z = -1.06$	<i>p</i> = 0.289
Less than 6 th grade (n, %)	N/A	N/A		
Junior high/Middle school (n, %)	N/A	N/A		
Partial high school (n, %)	1, 0.6%	N/A		
High school graduate (n, %)	13, 7.8%	8, 8.6%		
Partial college (n, %)	51, 30.7%	19, 20.4%		
College education (n, %)	72, 43.4%	49, 52.7%		
Graduate degree (n, %)	24, 14.5%	17, 18.3%		
Completed trade school beyond high school (n, %)	5, 3.0%	N/A		
Total Annual Household Income (median)	\$50,001 – \$75,000	\$35,001 – \$50,000	$U(N_{\text{bisexual}} = 166, N_{\text{LG}} = 93) = 7700.00, z = -0.03$	<i>p</i> = 0.974
\$0-\$15,000 (n, %)	14, 8.4%	8, 8.6%		
\$15,001-\$25,000 (n, %)	18, 10.8%	12, 12.9%		
\$25,001-\$35,000 (n, %)	24, 14.5%	13, 14.0%		
\$35,001-\$50,000 (n, %)	24, 14.5%	17, 18.3%		
\$50,001-\$75,000 (n, %)	39, 23.5%	13, 14.0%		
\$75,001-\$100,000 (n, %)	24, 14.5%	9, 9.7%		
\$100,001-\$200,000 (n, %)	15, 9.0%	16, 17.2%		
More than \$200,000 (n, %)	2, 1.2%	4, 4.3%		
Unsure or prefer not to answer (n, %)	6, 3.6%	5, 5.4%		
NSSI				
Lifetime (n, %)	105, 63.3%	65, 69.9%	$\chi^2(1, N=259) = 1.165$	<i>p</i> = 0.280
Number of Methods (M ± SD)	4.27 ± 4.62	3.46 ± 3.53	$t(233.45) = 1.578$	<i>p</i> = 0.116
Minority Stress (M± SD)	1.86 ± 0.54	1.94 ± 0.48	$t(257) = -1.268$	<i>p</i> = 0.206
Perceived Burdensomeness (M± SD)	12.40 ± 8.66	9.45 ± 6.65	$t(232.729) = 3.066$	<i>p</i> = 0.002
Thwarted Belongingness (M± SD)	20.56 ± 8.59	20.56 ± 9.28	$t(257) = 0.001$	<i>p</i> = 1.00

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Table 2

Minority Stress, IPTS, and NSSI Mediation Results (Full Sample Replication).

Predictor	Outcome = Perceived Burdensomeness		Outcome = Thwarted Belongingness		Outcome = NSSI	
	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i> [95% CI]	<i>t</i>
Minority Stress (path a)	0.43	7.60	0.25	4.21		
Total Effect (path c)					0.11	6.76
Direct Effect (path c')					0.27	4.47
Perceived Burdensomeness (path b ₁)					0.30	4.46
Thwarted Belongingness (path b ₂)					-0.06	-1.01
Indirect Effect (ab ₁)					0.13 [0.05-0.22]	0.31
Indirect Effect (ab ₂)					-0.02 [-0.06-0.02]	

Note. The *b* values represent standardized beta weights. The indirect effect (ab₁) represents the effect of minority stress on NSSI through perceived burdensomeness. The indirect effect (ab₂) represents the effect of minority stress on NSSI through thwarted belongingness.

Table 3

Minority Stress and IPTS Moderated Mediation.

Predictor	Outcome = Perceived Burdensomeness			Outcome = Thwarted Belongingness			Outcome = NSSI		
	<i>b</i>	<i>t</i>	<i>p</i>	<i>b</i>	<i>t</i>	<i>p</i>	<i>b</i> [95% CI]	<i>t</i>	<i>p</i>
Minority Stress (path a)	7.37	7.16	<.001	1.90	1.58	0.12			
Sexual Orientation	-3.50	-3.76	<.001	-0.59	-0.55	0.59			
Minority Stress x Sexual Orientation	-1.49	-0.81	0.42	7.84	3.62	<.001			
Perceived Burdensomeness (path b ₁ ; PB)							0.16	4.47	<.001
Thwarted Belongingness (path b ₂ ; TB)							-0.03	-1.01	0.31
Index of Moderated Mediation (PB)							-0.24 [-0.86 - 0.34]		
Index of Moderated Mediation (TB)							-0.24 [-0.85 - 0.30]		

Note. The *b* values represent unstandardized beta weights. The indirect effect (ab₁) represents the effect of minority stress on NSSI through perceived burdensomeness. The indirect effect (ab₂) represents the effect of minority stress on NSSI through thwarted belongingness.

Table 4

Bisexual-Specific Minority Stress, IPTS, and NSSI Mediation Results.

Predictor	Outcome = Perceived Burdensomeness			Outcome = Thwarted Belongingness			Outcome = NSSI		
	<i>b</i>	<i>t</i>	<i>p</i>	<i>b</i>	<i>t</i>	<i>p</i>	<i>b</i> [95% CI]	<i>t</i>	<i>p</i>
Heterosexual Minority Stress (path a)	0.27	3.55	< .001	0.16	2.06	0.04			
Total Effect (path c)							0.24	3.20	0.002
Direct Effect (path c')							0.15	2.08	0.04
Perceived Burdensomeness (path b ₁)							0.42	5.15	<.001
Thwarted Belongingness (path b ₂)							-0.14	-1.80	0.07
Indirect Effect (ab ₁)							0.11 [0.02 - 0.18]		
Indirect Effect (ab ₂)							-0.02 [-0.07 - 0.01]		
L/G Minority Stress (path a)	0.24	3.18	0.002	0.12	1.41	0.16			
Total Effect (path c)							0.27	3.63	<.001
Direct Effect (path c')							0.19	2.60	0.01
Perceived Burdensomeness (path b ₁)							0.41	5.09	<.001
Thwarted Belongingness (path b ₂)							-0.14	-1.71	0.08
Indirect Effect (ab ₁)							0.10 [0.02-0.20]		
Indirect Effect (ab ₂)							-0.01 [-0.06 - 0.01]		

Note. The *b* values represent standardized beta weights. The indirect effect (ab₁) represents the effect of minority stress on NSSI through perceived burdensomeness. The indirect effect (ab₂) represents the effect of minority stress on NSSI through thwarted belongingness.