

Bisexual-Specific Minority Stressors, Psychological Distress, and Suicidality in Bisexual Individuals: the Mediating Role of Loneliness

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Abstract Bisexual individuals are at higher risk for poor mental health outcomes compared to heterosexual as well as lesbian and gay individuals and experience minority stressors, such as discrimination, from both heterosexual and sexual minority communities. However, there is little research examining the negative effects of bisexual-specific minority stressors on bisexual individuals' mental health as well as psychological factors that might help explain minority stressors' deleterious effects. This research examined the effects of distal minority stressors (i.e., anti-bisexual experiences from both heterosexual as well as lesbian and gay people) and proximal stressors (i.e., internalized heterosexism and sexual orientation concealment) on psychological distress and suicidality among bisexual adults ($N = 503$). Building on the relational framing of the minority stress model, we also tested one relational factor (i.e., loneliness) as a mediator of the associations between distal and proximal minority stressors and poor mental health (i.e., psychological distress and suicidality). Structural equation modeling analyses were used to test the mediating effects of loneliness on the associations between minority stressors and psychological distress and suicidality. Although distal and proximal minority stressors were not associated with each other, loneliness mediated the

effects of distal and proximal minority stressors on psychological distress and suicidality. The results of this study underscore the importance of targeting bisexual-specific minority stressors as well as loneliness in preventive interventions to improve the mental health of bisexual individuals.

Keywords Bisexual · Minority stress · Mental health · Psychological distress · Suicide · Loneliness

Sexual minorities (e.g., lesbian, gay, bisexual, or queer individuals) are at greater risk for poor mental health outcomes than their heterosexual counterparts (Institute of Medicine 2011). Among specific subgroups of sexual minorities, an emerging body of literature indicates that bisexual individuals are at greater risk for poor health outcomes compared to heterosexuals and other sexual minorities (i.e., lesbians and gay men). Bisexuality encompasses attraction to more than one gender and/or identifying as bisexual. Bisexual individuals are at greater risk for depression, anxiety, and suicidality than heterosexuals and other sexual minorities (Bostwick et al. 2010; Kerr et al. 2013; Pompili et al. 2014; Pyra et al. 2014). Despite bisexual individuals' heightened health risk, there is a dearth of literature examining unique risk factors associated with their mental health. Identifying bisexual-specific risk factors is crucial to informing preventive efforts to improve the mental health of bisexuals.

The minority stress model is commonly used to explain sexual orientation disparities in health (Meyer 2003). The model posits that, beyond the effects of general stress, sexual minorities experience unique and chronic stigma-specific stressors (i.e., minority stressors) that are related to their marginalized identity and compromise their health. These may be distal stressors, which are external stressful events such as acts of discrimination (e.g., hate

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crimes, family rejection). They also may be proximal stressors, which are individuals' internalized stress processes, such as internalizing heterosexist stigma into one's self-concept and concealing one's sexual orientation. There is limited existing research drawing comparisons between bisexual, lesbian, and gay individuals' experiences of minority stress. However, the limited evidence that exists suggests that bisexual individuals are more likely than other sexual minorities to experience some proximal stressors such as sexual orientation concealment (e.g., Balsam and Mohr 2007).

There is much empirical evidence supporting the associations between distal minority stressors and poor health outcomes among sexual minorities (e.g., Brewster et al. 2013; Mereish and Poteat 2015; Szymanski and Sung 2010) as well as proximal minority stressors and poor health outcomes (Newcomb and Mustanski 2010). However, most of these studies aggregated bisexual participants with other sexual minority groups and did not examine bisexual-specific minority stressors.

In addition to minority stressors experienced by all sexual minorities (e.g., heterosexism and homophobia), bisexual individuals experience unique bisexual-specific minority stressors and stigma (e.g., biphobia or anti-bisexual prejudice; Bostwick and Hequembourg 2014; Brewster and Moradi 2010; Dodge et al. 2016; Firestein 1996; Roberts et al. 2015). For example, bisexuals' sexual orientation is often perceived as immoral and unstable and bisexuals are stereotyped to be confused about their sexual orientation, hypersexual, and sexually promiscuous individuals who are more likely to transmit sexually transmitted diseases (Bostwick and Hequembourg 2014; Brewster and Moradi 2010; Flanders et al. 2016). A recent national survey of US adults demonstrates that these stereotypes continue to be endorsed (Dodge et al. 2016). Moreover, bisexual individuals also experience unique forms of hostility (Bostwick and Hequembourg 2014). They are stigmatized by being perceived as disloyal (Brewster and Moradi 2010), and heterosexual, lesbian, and gay individuals are generally less willing to be in a romantic relationship with a bisexual individual (Feinstein et al. 2014; Flanders et al. 2016). Additionally, prejudice research shows that heterosexuals hold more prejudice toward bisexual individuals than toward lesbians and gay men (Eliason 1997), and despite changes in attitudes toward lesbians and gay men, prejudice toward bisexuals has remained consistent (Dodge et al. 2016).

Many bisexual-specific minority stressors are not only enacted by heterosexuals but also by other sexual minorities, such as lesbians and gay men, a phenomenon called "double discrimination" (Bostwick and Hequembourg 2014; Brewster and Moradi 2010; Friedman et al. 2014; Roberts et al. 2015). Furthermore, bisexual individuals

experience more violence and victimization than heterosexuals, lesbians, and gay men (Breiding et al. 2010; Katz-Wise and Hyde 2012). Experiencing "double discrimination" related to their sexual orientation may help explain the unique health disparities faced by bisexuals (Friedman et al. 2014). However, bisexual men and women are largely invisible in both heterosexual and sexual minority communities and psychological research (Eliason 1997; Flanders et al. 2016). There is also limited research examining the effects of bisexual-specific minority stressors on bisexual individuals' mental health and associated mediating mechanisms.

Minority stressors are inherently relationally disruptive and lead to social isolation and loneliness and in turn poor health (Mereish and Poteat 2015). In fact, minority stressors are directly associated with social isolation, decreased social supports, and loneliness (Díaz et al. 2001; Kuyper and Fokkema 2011; Mereish and Poteat 2015). This is consistent with literature suggesting that stigmatized groups are generally at higher risk for loneliness (Cacioppo et al. 2015). Bisexual individuals experience stigma and rejection from both heterosexual and lesbian and gay communities, which has been linked to a sense of invisibility and isolation (Rust 2002). Thus, loneliness might be a particularly relevant mechanism for bisexual individuals in explaining how bisexual-specific minority stressors are associated with poor mental health. Reviews of the clinical significance of loneliness in the general population have documented that it is significantly associated with poor mental health outcomes, including depression and suicide (Hawkley and Cacioppo 2010). Among studies of sexual minorities, loneliness is also associated with poor mental health outcomes (Díaz et al. 2001; Mereish and Poteat 2015). However, research has not tested loneliness as a potential mediating mechanism between bisexual-specific minority stressors and poor mental health for bisexual individuals, despite it being a key mechanism for intervention (Cacioppo et al. 2015).

Purpose of Proposed Study/Research Questions

Some studies have more recently examined the minority stress model and its psychological mediation adaptation among sexual minorities more broadly, but very little work has focused on bisexual individuals. Moreover, there is little research testing the relationship between bisexual-specific minority stressors and mental health as well as the pathways through which minority stressors are associated with poorer mental health outcomes among bisexual individuals. Identifying such pathways can inform preventive interventions to address bisexuals' mental health. As such, this study aims to (1) fill existing gaps

in knowledge of minority stress processes in bisexual communities, (2) address an existing gap in the knowledge of the mental health effects of bisexual-specific minority stress, and (3) investigate one possible mechanism by which bisexual-specific stress may contribute to poor mental health by testing the relational framing of the minority stress model (Mereish and Poteat 2015). In this study, we tested one relational factor (i.e., loneliness) as a mediator of the associations between distal and proximal minority stressors and poor mental health (i.e., psychological distress and suicidality) among a sample of bisexual adults. We build on this relational framework to focus solely on bisexual individuals and the effects of bisexual-specific minority stressors.

First, consistent with the minority stress model, we hypothesized that distal stressors (i.e., anti-bisexual prejudice from heterosexual, lesbian, and gay individuals) and proximal stressors (i.e., internalized heterosexism and concealment) would be associated with each other (path A, Fig. 1). Second, we hypothesized that distal and proximal stressors would be associated with higher levels of loneliness (paths B and C; Gierveld and Van Tilburg 2010). Third, we hypothesized that greater loneliness will be associated with greater psychological distress and suicidality (paths D and E), as supported in the literature (Diaz et al. 2001; Mereish and Poteat 2015). Fourth, we hypothesized that loneliness would mediate the associations between minority stressors and psychological distress and suicidality; specifically, we hypothesized that minority stressors would have indirect associations with psychological distress and suicidality through their associations with loneliness. Although not tested in the proposed model, we hypothesized that minority stressors would be correlated with psychological distress and suicidality.

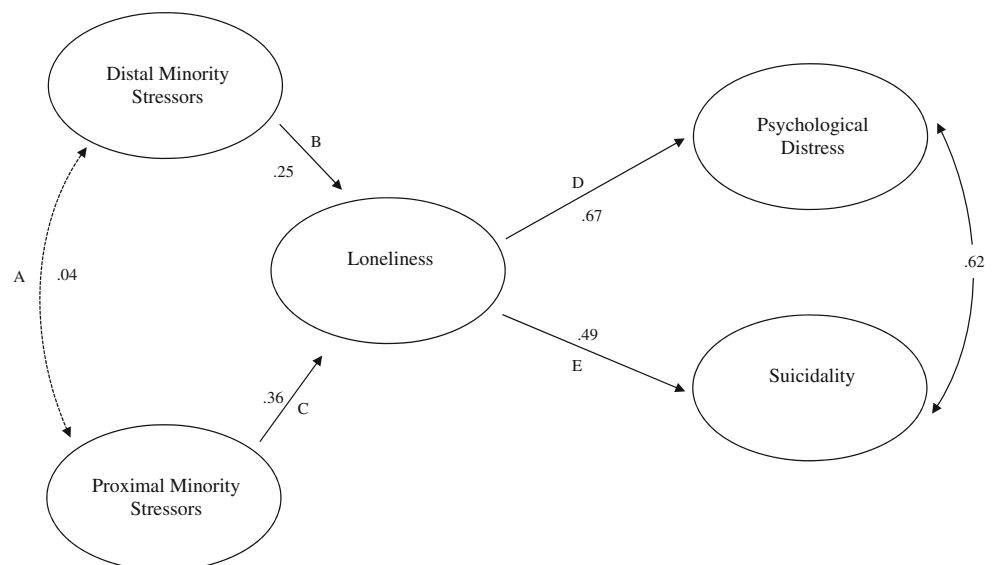
In addition to testing the minority stress model (Meyer 2003; Fig. 1), we also tested the psychological mediation adaptation of the model (Hatzenbuehler 2009). Consistent with this adaptation, we hypothesized that proximal minority stressors would mediate the association between distal minority stressors, loneliness, and poorer mental health. Specifically, bisexual-specific distal minority stressors would be associated with more proximal minority stressors and loneliness, which in turn would be associated with more psychological distress and suicidality.

Method

Procedures

We recruited participants through online sexual minority and bisexual-specific groups and listservs (e.g., social groups and online networks) for a study of bisexual people's health and wellbeing. Internet recruitment of participants is a successful and common method to obtain representative samples (Kraut et al. 2004) and to reach sexual minority populations (Moradi et al. 2009). Inclusion criteria were age 18 years or older and identifying as bisexual and/or having attractions to more than one gender. All potential participants received a link to the data collection website, on which they provided informed consent and completed an online survey which started with demographics and then proceeded to the study's measures. Participants had the option of being entered into a raffle for a monetary incentive for their participation. At the end of the survey, participants were presented with a list of online resources providing sexual minority-specific mental health support and services. The study was approved by the researchers' Institutional Review Board.

Fig. 1 Proposed model: bisexual-specific minority stressors, psychological distress, and suicidality



The data were cleaned and screened for missing cases. An initial 961 prospective individuals clicked the survey link, and 935 participants initiated the online survey. Participants who terminated their participation in the online survey prematurely or stopped taking the survey all together prior to completing any of the items for the primary measures were removed from the dataset ($n = 432$). Analyses comparing participants who terminated taking the survey early to participants who finished completing the entire survey indicated that they did not differ in most of the demographic variables, and, in some instances, were less likely to identify as bisexual and more likely to be male. This data cleaning procedure and the degree of missingness is consistent with prior online studies of sexual minorities (Brewster et al. 2013). Of the 503 participants included in this study, some had missing data on the item level; however, most had no more than 0.60% item-level missingness and three had no more than 1%, which is considered small (Parent 2013). We conducted available item analysis procedures to address these missing data points. Specifically, for participants with missing data, mean imputation was conducted based on the available item responses for each measure within each participant. This procedure is recommended and performs equally to multiple imputation procedures (Parent 2013).

Participants

Participants were 503 adults ages 18 to 64 years ($M = 28.50$, $SD = 9.55$) who identified as cisgender (non-transgender) women (76.5%), cisgender men (11.3%), and transgender/gender non-binary (12.1%). They identified their sexual orientation as bisexual (74.6%), queer (16.1%), pansexual (3.8%), gay (0.6%), lesbian (0.6%), heterosexual (1.0%), and other (3.4%); participants who were not bisexually identified were included in this study as they endorsed attraction to more than one gender. Participants were White (80.1%), biracial or multiracial (7.8%), Hispanic/Latino/a (4.0%), Asian/Asian American or Pacific Islander (2.8%), Black/African American (2.4%), Middle Eastern/Arab or Arab American (0.8%), Native American (0.4%), and other (1.8%). Participants lived in the following US regions: Northeast (23.3%), Midwest (17.5%), West (10.7%), South (8.5%), Southwest (6.8%), Northwest (3.4%), or other US territories (0.4%); 29.3% reported living internationally in a non-US territory. They reported their education level as: some high school (3.0%), high school degree or GED equivalent (30.4%), Associate degree (8.7%), Bachelor's degree (30.4%), and Master's degree or higher (27.5%). Many participants were low income (annual income \leq \$19,999; 56.7%), with 37.8% students and 34.6% working full-time. Participants were in varying relationship statuses: 37.8% single, 33.4% partnered or committed relationship, 16.7% married, 11.3% dating, and 0.8% separated/divorced.

Measures

Distal Minority Stressors Bisexual-specific distal stressors were assessed with the Anti-Bisexual Experiences Scale (Brewster and Moradi 2010), which measured anti-bisexual prejudice from heterosexual people (ABES-H; 17-items) and from lesbian/gay people (ABES-LG; 17-items). Response options were on a 6-point scale, ranging from 1 (*never*) to 6 (*almost all of the time*). The mean of the scale was computed and higher scores indicate higher levels of bisexual-specific distal stressors; score ranges are reported in Table 1. For this study, the Cronbach alpha reliability coefficients for the ABES-H and ABES-LG scales were 0.95 and 0.97, respectively.

Proximal Minority Stressor: Internalized Heterosexism

The 5-item Internalized Homonegativity subscale of the Lesbian, Gay, and Bisexual Identity Scale (Mohr and Fassinger 2000) was used to assess internalized heterosexism. Three items were adapted to be bisexual-sensitive for this study (e.g., "I'm proud to be part of the bisexual/queer community" and "I am glad to be a bisexual/queer person"; both were reverse-coded); specifically, "LGB" was replaced with "bisexual/queer." The items' response options were on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The mean of the scale was computed and higher scores indicate higher levels of internalized heterosexism. For this investigation, the Cronbach alpha reliability was .85.

Proximal Minority Stressor: Concealment

The 3-item Concealment Motivation subscale of the Lesbian, Gay, and Bisexual Identity Scale (Mohr and Kendra 2011) was used to assess sexual orientation concealment. Participants were asked to indicate their experience as an LGB person to three items. Two items were adapted to be more sensitive to bisexual individuals (i.e., "I prefer to keep my romantic relationships rather private" and "I keep careful control over who knows about my romantic relationships."); specifically, the phrase "same-sex attractions" was changed to "romantic attractions." Item response options were on a 6-point Likert scale, ranging from 1 (*disagree strongly*) to 6 (*agree strongly*). The mean of the scale was computed and higher scores indicate higher levels of sexual orientation concealment motivation. For this investigation, the Cronbach alpha reliability was .86.

Loneliness Mediator Social and affective domains of feelings of loneliness were assessed with the 6-item short form scale of the De Jong Gierveld Loneliness Scale (Gierveld and Tilburg 2006). Item response options were on a 5-point scale ranging from 1 (*yes!*), 3 (*more or less*), to 5 (*no!*). The mean of the scale was computed and higher scores indicate higher levels of loneliness. For this study, the Cronbach alpha reliability was .87.

Table 1 Correlations among the exogenous, endogenous, and mediation variables

| | ABES-H | ABES-LG | Internalized heterosexism | Concealment | Depression symptoms | Anxiety symptoms | Suicidality | Loneliness |
|---------------------------|--------|---------|------------------------------|-------------|------------------------|---------------------|-------------|------------|
| ABES-H | – | | | | | | | |
| ABES-LG | .83** | – | | | | | | |
| Internalized heterosexism | –.01 | –.02 | – | | | | | |
| Concealment | .03 | .01 | .31** | – | | | | |
| Depression symptoms | .22** | .23** | .09** | .15** | – | | | |
| Anxiety symptoms | .29** | .28** | .10** | .17** | .63** | – | | |
| Suicidality | .24** | .25** | .03 | .03 | .60** | .46** | – | |
| Loneliness | .20** | .19** | .17** | .27** | .62** | .45** | .42** | – |
| Mean | 2.66 | 2.62 | 1.86 | 3.63 | 2.24 | 2.01 | 8.26 | 2.79 |
| SD | 1.00 | 1.23 | 1.03 | 1.38 | 0.81 | 0.68 | 3.61 | 1.09 |
| Range | 1–6 | 1–6 | 1–6.2 | 1–6 | 1–4 | 1–4 | 3–18 | 1–5 |

ABES-H anti-bisexual prejudice from heterosexuals, ABES-LG anti-bisexual prejudice from lesbians and gay men

* $p < .05$, ** $p < .01$

Psychological Distress The 7-item depression and 7-item anxiety subscales of the Depression, Anxiety, and Stress Scale-21 (Lovibond and Lovibond 1995) were used to assess symptoms of depression and anxiety as indicators of psychological distress. Item response options were on a 4-point scale ranging from 1 (*Did not apply to me at all*) to 4 (*Applied to me very much, or most of the time*). The mean of the scale was computed and higher scores indicate higher levels of psychological distress. For this study, the Cronbach alpha reliability coefficients were .93 for the depression subscale and .85 for the anxiety subscale.

Suicidality The 4-item Suicidal Behaviors Questionnaire-Revised (SBQ-R; Osman et al. 2001) assessed suicidality. The SBQ-R assesses a range of suicidality from suicidal ideation to attempts. Consistent with scoring procedures, the sum of all four items indicates greater suicidality. The SBQ-R has been found to differentiate between suicidal and non-suicidal subgroups among non-clinical samples (Osman et al. 2001). The SBQ-R has been used with diverse samples, and researchers have reported high alpha reliability coefficients among varying samples (e.g., Chang et al. 2010), including sexual minorities (Harris 2013). For this investigation, the Cronbach alpha reliability was .76 based on the standardized items.

Analysis Plan for Testing the Proposed Models

We used structural equation modeling (SEM) in AMOS 20.0 (Arbuckle 2011) to test the measurement model and the structural models. Given the large number of participants in our study, our sample size met adequate power standards for using SEM (Schumacker and Lomax 2010; Thompson 2000). We

used several fit indices to assess whether each model was a good fit to the data: root-mean-square error of approximation (RMSEA), incremental fit (IFI), comparative fit (CFI), and non-normed fit (NNFI) indices. Values between .90 and .95 for the IFI, CFI, and NNFI are considered good model fit (Schumacker and Lomax 2010). RMSEA values of .06 or below indicate good model fit (Schumacker and Lomax 2010). The chi-square statistic was not used because it has many limitations and discrepancies, especially with larger samples (Cheung and Rensvold 2002).

Model Specification The distal stressors factor was composed of two indicators: anti-bisexual prejudice from heterosexuals and anti-bisexual prejudice from lesbians and gay men. The proximal stressors factor was also composed of two indicators: internalized heterosexism and concealment. Finally, the psychological distress factor was composed of two indicators: anxiety and depressive symptoms. Given the small number of items of the suicidality measure, the suicidality factor was composed of four indicators, which were the four items of the suicidality scale. Three parcels were computed and used as indicators for the loneliness factor. Parcels can improve reliability and minimize potential violations of assumptions of multivariate normality (Little et al. 2002). Given the loneliness scale had six items, we chose to parcel rather than use each item as an indicator because parceling permits for fewer parameter estimates, lower likelihood of correlated residuals, and reduce sampling error (Little et al. 2013). We computed parcels using the item-to-construct balance technique (Little et al. 2002), such that items with the highest and lowest factor loadings

were evenly distributed across the three parcels of each construct.

We controlled for gender, sexual orientation, employment, relationship status, and education. We included each demographic variable as an observed indicator in the measurement model and controlled for each demographic variable and its association with each of the five factors in the structural models (i.e., distal stressors, proximal stressors, loneliness, psychological distress, and suicidality). Due to a large number of missing cases for age ($n = 40$), we did not control for it in our models.¹

In our measurement and structural models, each observed indicator was constrained to load only on its respective latent factor. For the measurement model, each covariance among factors was free to be estimated; however, the measurement errors were not allowed to correlate. Covarying endogenous variables in some statistical software, such as AMOS, is not permitted; however, covarying their residuals is permitted if a correlation is desired between endogenous variables (Kenny 2011). Therefore, in the structural model, the residuals of the two minority stress factors as well as of the two psychological distress and suicidality factors were allowed to covary with each other to represent the conceptual and empirical associations between these constructs in the proposed model (Fig. 1).

Bootstrapping We used bootstrapping procedures to obtain indirect effect estimates and because bootstrapping is a resampling procedure that is optimal, effective, and recommended for handling non-normally distributed data (MacKinnon et al. 2004). Bias-corrected bootstrapping is relatively best compared to other bootstrapping techniques and it offers greater statistical power and precision (MacKinnon et al. 2004). We used the bias-corrected bootstrapping procedure with 95% confidence intervals with 1000 samples.

Results

Preliminary Analyses

For descriptive purposes, correlations among all the variables and basic scale descriptive statistics are reported in Table 1.

¹ To ascertain the effects of age, we conducted additional analyses. We first removed 40 participants who did report their age and compared them to participants who reported their age; there were no significant differences in demographic variables or the constructs in our models between these two groups. We then ran a structural model while controlling for age as well as the other aforementioned variables. This model had good fit with the data and similar results to the models presented. To maximize our sample size, we present the models not controlling for age.

The correlations are based on computed scales, which should not be confounded with the latent factors in the structural model. Most of the variables were significantly correlated in conceptually consistent directions (range: 0.09 to 0.83); however, distal and proximal minority stressors were not significantly correlated with each other and proximal stressors were not correlated with suicidality. The patterns of associations between these constructs are explained in greater detail in the tested latent structural models.

To determine which demographic variables to account for in our structural equation modeling analyses, we conducted a MANOVA to test whether participants differed on the study's constructs of interest based on demographic variables. There was a significant effect for gender, Wilks's $\Lambda = .911$, $F(16, 920) = 2.73$, $p < .001$, $\eta_p^2 = .05$; sexual orientation, Wilks's $\Lambda = .93$, $F(16, 920) = 2.12$, $p < .05$, $\eta_p^2 = .04$; employment, Wilks's $\Lambda = .891$, $F(24, 1334) = 2.26$, $p < .001$, $\eta_p^2 = .04$; relationship status, Wilks's $\Lambda = .89$, $F(24, 1334) = 2.36$, $p < .001$, $\eta_p^2 = .04$; and education, Wilks's $\Lambda = .86$, $F(16, 920) = 4.60$, $p < .001$, $\eta_p^2 = .07$. There were no differences for race ($p = .86$), income ($p = .17$), or geographical location ($p = .58$).

Transgender and gender non-binary individuals reported more loneliness than females ($\eta_p^2 = .02$) and more suicidality than males and females ($\eta_p^2 = .04$). Bisexual and queer individuals reported more anti-bisexual prejudice from heterosexual people ($\eta_p^2 = .02$) and less internalized biphobia ($\eta_p^2 = .08$) than all other sexual orientation groups; bisexual individuals reported more anti-bisexual prejudice from lesbian and gay people than all other sexual orientation groups ($\eta_p^2 = .02$) but not more than queer individuals.

In terms of employment, individuals who were employed full-time reported less loneliness ($\eta_p^2 = .07$), psychological distress ($\eta_p^2 = .05$), and suicidality ($\eta_p^2 = .02$) than individuals who were employed part-time, unemployed, or students. Students reported less anti-bisexual prejudice from lesbian and gay people than part-time, unemployed and other individuals (e.g., stay-at-home parent, disabled, etc.; $\eta_p^2 = .03$); other individuals reported less loneliness than individuals who were working part-time or were unemployed ($\eta_p^2 = .07$), and less psychological distress than individuals working part-time ($\eta_p^2 = .05$). As for relationship status, individuals who were single were more likely to report concealment than partnered and committed individuals ($\eta_p^2 = .04$) and more likely to report loneliness than dating, partnered, committed, and married individuals ($\eta_p^2 = .05$). In terms of education, individuals with a graduate or professional degree or higher reported more anti-bisexual prejudice from lesbian and gay people than individuals with a high school degree, GED equivalent, or lower ($\eta_p^2 = .04$). Individuals with a high school degree, GED equivalent, or lower reported more concealment than individuals with a graduate degree or higher ($\eta_p^2 = .02$), and more psychological distress ($\eta_p^2 = .04$) and suicidality ($\eta_p^2 = .02$) than

individuals with any form of higher education; individuals with an associates or college degree reported more psychological distress than individuals with graduate degree or higher reported ($\eta_p^2 = .04$).

Testing Proposed Model

The measurement model was a good fit to the data (IFI = .97; CFI = .97; NNFI = .96; RMSEA = .055 [.044, .067]). Similarly, the proposed model had a good fit to the data (IFI = .96; CFI = .96; NNFI = .94; RMSEA = .051 [.043, .060]). As hypothesized and reported in Fig. 1, our proposed model indicated that both distal and proximal stressors were associated with more loneliness ($\beta = .25$ and $.36$, respectively, $p < .001$) and loneliness was strongly associated with more psychological distress and suicidality ($\beta = .67$ and $.49$, respectively, $p < .001$), while accounting for demographic variables. However, distal and proximal minority stressors were not significantly associated with each other ($p = .55$). Consistent with our mediation hypothesis, the indirect effects of distal and proximal minority stressors on psychological distress and suicidality through loneliness were significant, such that distal and proximal minority stressors were associated more psychological distress and suicidality through their association with more loneliness (Table 2; $\beta_{\text{distal stress}} = .17$ for psychological distress and $.12$ for suicidality; $p = .001$ and $.002$, respectively; $\beta_{\text{proximal stress}} = .24$ for psychological distress and $.17$ for suicidality; $ps = .002$).

To rigorously test the mediation model, we also tested a modification of our proposed model to include the direct paths from distal and proximal stressors to psychological distress and suicidality. The model had an adequate fit to the data (IFI = .97; CFI = .97; NNFI = .95; RMSEA = .046 [.037, .055]). The direct paths from distal stressors to psychological and distress and suicidality were significant ($\beta = .19$ and $.21$, respectively,

$p < .001$); however, the direct paths from proximal stressors to psychological distress and suicide were not significant ($\beta = -.02$, $p = .76$; $\beta = -.16$, $p = .05$, respectively). We conducted nested comparisons to test for significant differences between the proposed model and modified model. The chi-square change between our proposed model ($\chi^2 = 229.55$, $df = 99$) and the modified model ($\chi^2 = 195.72$, $df = 95$) was not significantly different in fit ($p > .05$). As such, we retained our proposed model for parsimony.

Given that distal and proximal minority stressors were not correlated with each other in our correlation analyses nor were they covarying in the SEM analyses, we do not provide the results for the alternative psychological mediation model of minority stress because it was not statistically supported. However, we did test it and did not find statistical support for the model.

Discussion

The aim of this study was to examine whether bisexual-specific distal and proximal stressors were associated with adverse mental health among bisexual individuals and to determine whether these associations were mediated by loneliness. Results indicated that distal and proximal stressors were associated with psychological distress and suicidality and that loneliness significantly mediated these associations. In addition, direct associations were found between distal and proximal minority stressors and loneliness and between loneliness and poor mental health outcomes. These findings are consistent with previous research demonstrating these associations among sexual minorities (Kuyper and Fokkema 2011; Mereish and Poteat 2015), and suggest that this minority stress pathway is occurring specifically among bisexual individuals potentially as a result of bisexual-specific stressors.

For bisexual individuals, experiencing anti-bisexual prejudice (distal stressor), internalized heterosexism (proximal stressor), and identity concealment (proximal stressor) appears to be related to feelings of loneliness and ultimately psychological distress and suicidality. Results from the current study shed light on why bisexual individuals may be at a higher risk for adverse mental health (e.g., Bostwick et al. 2010; Pompili et al. 2014). Experiencing stress that is uniquely related to being bisexual adversely affects bisexual individuals' mental health and is distinct from the effects of sexual minority stress on lesbian and gay individuals. It is important to highlight experiences of loneliness among bisexual individuals. Experiencing rejection from both heterosexual and sexual minority communities (Friedman et al. 2014) may lead bisexual individuals to become isolated from both communities (Rust 2002), which affects their ability to access support and resources. This is often compounded by a lack of support and resources that are specifically for bisexual individuals and address bisexual-specific issues, such as bisexual invisibility

Table 2 Total indirect effects estimates for the models

| Total indirect effects | Standardized values (95% confidence interval) Model 1 |
|---------------------------------|---|
| Effect of distal stressors on | |
| Psychological distress | .17 (.102, .245)** |
| Suicidality | .12 (.071, .183)** |
| Effect of proximal stressors on | |
| Psychological distress | .24 (.136, .365)** |
| Suicidality | .17 (.101, .270)** |

Bootstrapping procedures were conducted on 1000 generated samples to test the significance of the indirect effects. The standardized bias-corrected bootstrap indirect effects and their respective confidence intervals are reported. Values in parentheses are the upper and lower bounds of the 95% confidence interval

** $p < .01$

and erasure. Preventive efforts could target bisexual individuals' experiences of rejection and loneliness within heterosexual and sexual minority communities by improving access to bisexual-specific support and resources, such as bisexual support groups or mentorship programs, particularly for bisexual youth. This would allow for greater connection to other bisexual individuals and foster a sense of bisexual community.

Although distal and proximal stressors are typically found to be associated with one another in studies of sexual minority stress, the current study did not yield the same pattern. This novel result is important to consider when applying the minority stress model and the psychological mediation framework to bisexual individuals (Hatzenbuehler 2009; Meyer 2003). Bisexual individuals may experience both types of stressors and these minority stressors appear to be unique and independent from each other. Future research is needed to better understand whether other individual and contextual factors are associated with experiencing one type of stressor or another. Additionally, the proximal stressors examined in this study may affect bisexual individuals differently than from other sexual minority individuals (e.g., lesbian women or gay men). For example, greater exposure to heterosexist harassment is typically associated with greater identity concealment and internalized heterosexism among lesbian and gay people, which in turn can prevent lesbian and gay people from accessing support from others. However, this relationship may be different in the bisexual community given the invisibility of bisexual people in both sexual minority and heterosexual communities, who are often assumed to be gay or heterosexual (Firestein 1996). Consequently, bisexual people may need to actively "out" themselves in both queer and heterosexual spaces, despite any prior experiences of distal stressors. Preventive efforts could target distal and proximal stressors by establishing norms and policies in both heterosexual and sexual minority spaces to address anti-bisexual bullying and prejudice, which can make it feel safer for bisexual individuals to come out, resulting in less identity concealment. Moreover, further validation of proximal stress measures with bisexual individuals could better clarify how these constructs may be related and apply to this group.

In addition to the aforementioned implications for prevention, results from this study have several implications for mental health practice with bisexual individuals. First, although distal and proximal stressors were not associated with one another in this study, it is important to consider bisexual-specific minority stressors that include both types of stressors, as both adversely affect mental health. Second, findings regarding loneliness as a mediator between stressors and mental health outcomes suggest that bisexual individuals may need to be connected to support and resources that specifically affirm

their bisexuality. Since these resources are often concentrated in urban centers, it may be useful to help bisexuals find online support and connection to bisexual communities. Lastly, it is important to recognize that the stress experiences of bisexual individuals may be unique to bisexual identity and life experience.

As with all research, this study had several limitations. The cross-sectional nature of this study did not allow for testing longitudinal associations among stressors, loneliness, and mental health outcomes. Future research should use longitudinal designs to better establish temporality of these experiences. In terms of sampling, the sample in this study was self-selected; we recruited individuals who either identified as bisexual or reported attractions to more than one gender. It is possible that these findings are not representative of the general population of bisexual individuals, particularly those who may not have access to the internet, such as individuals who are low income. However, little research has specifically highlighted the experiences of bisexual individuals, as this research has done, making it a significant contribution to the field. Third, there were some limitations in our measures. For example, we adapted the concealment motivation measure to be more culturally sensitive of bisexual individuals; however, doing this might have caused underreporting of concealment. Despite the potential for underreporting, we found theoretically and empirically consistent relationships. Future research using more adequate measures specifically developed for bisexual individuals might document stronger associations found in this study. Furthermore, our measure of internalized heterosexism only examines the experience of internalizing stereotypes about being bisexual, disliking being bisexual, and desiring to be heterosexual; this does not capture "internalized homophobia" (i.e., perceiving being gay or lesbian as less stigmatizing than being bisexual; desiring to be gay/lesbian and not bisexual). Although we are not aware of any internalized homophobia measures, future research should consider this construct and how it relates to bisexual-specific minority stressors. Fourth, about 29% of our participants are international; thus, their experiences of bisexual-specific minority stressors might not have been comprehensively captured due to potential cultural differences in stigma and biphobia.

Moreover, the gender and racial/ethnic breakdown of the participants did not yield enough power to examine gender or race/ethnicity differences. Individuals who occupy minority positions based on other identities may experience bisexual-specific stressors differently. Future research could attempt to recruit a larger number of transgender bisexual individuals to see if their experiences of bisexual-specific minority stress are different from bisexual individuals who are cisgender women and men. Similarly, research could recruit larger samples of racial/ethnic minorities to allow for examination of racial/ethnic group differences in bisexual-specific minority stress.

It would also be useful in future studies to examine these stress pathways among adolescents who are bisexual to see whether the same pattern occurs among a young age group, which may have lasting effects into adulthood. Lastly, we did not examine the potential moderating effects of levels of identity saliency on our model; identity saliency and other developmental identity factors may shape the patterns of results and warrant future research.

Strengths of this study included recruitment of bisexual individuals based on both bisexual identity and attraction to more than one gender, which reflects a more inclusive definition of bisexuality than is typically used in research. In addition, conducting this study online allowed for participation from multiple regions of the USA, yielding a more representative sample. Moreover, we examined a comprehensive set of distal and proximal minority stressors, whereas many studies only examine one domain of minority stress.

In conclusion, this study examined associations between bisexual-specific distal and proximal minority stressors and mental health among bisexual adults, finding that both types of stressors were associated with adverse mental health and that these associations were mediated by loneliness. This research highlights the unique stress experiences of bisexual individuals, with implications for addressing bisexual-specific stress in clinical settings as well as designing preventive interventions that increase access to bisexual-specific support and resources. Bisexual-specific experiences must be considered independently from the experiences of other sexual minority subgroups to address sexual orientation disparities in mental health.

Compliance with Ethical Standards

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Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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