Minority stressors and the life satisfaction of sexual minority adults

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Public Significance Statement: The present study tested assumptions of the minority stress model by examining the associations between five minority stressors and life satisfaction with theorized moderators. Our study (1) highlights the importance of minority stress in sexual minority well-being and (2) emphasizes the need for future research on the factors that exacerbate or buffer against minority stress.

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Abstract

According to minority stress theory, minority stressors (e.g., discrimination, internalized homophobia) negatively impact sexual minorities' life satisfaction, and individual differences in their life satisfaction are thought to be related to the degree and amount of minority stress. However, these stressors are often examined separately, leaving questions about the robustness of various minority stressors in the face of other minority stressors that likely co-occur. The adverse effects of minority stress, however, may be moderated by the amount of social support, LGBTQ+ community connectedness, and the centrality of one's sexual identity. Different age groups, sexual orientations, and racial/ethnic groups may also vary in the degree to which minority stress relates to well-being through differential experiences of these stressors. We tested these assumptions of minority stress theory and the moderating role of the aforementioned factors in an American sample of 1507 sexual minority adults. We used specification curve analysis to estimate multiple linear regression models as a form of multiverse analysis to examine the robustness of all these effects. We found that the minority stressors discrimination, stigmatization, and identity concealment negatively impacted life satisfaction when adjusting for other minority stress and more general stress. However, we found that the proposed moderators did not buffer against minority stress. We additionally found that different groups of sexual minorities did not differ in how minority stressors were related to life satisfaction. Discussion centers around findings of minority stress and contextualizing LGBTQ+ experiences.

WC: 235/250

Keywords: minority stress, life satisfaction, sexual minority, social support, community connectedness, identity centrality

Minority stressors and the life satisfaction of sexual minority adults

Over the last decade, the number of people who identify as a sexual minority has doubled in the United States (Jones, 2024). Increases in sexual minority identification track with increased visibility, equality rights, and representation, which signals social acceptance for sexual minorities (Hammack, 2018; Jones, 2024). Yet, sexual minorities are still heavily stigmatized for their minoritized identity (e.g., Flores et al., 2023), which is thought to explain disparities in health and well-being (Diamond & Alley, 2022; Flentje et al., 2025; Meyer, 2003). Identifying risk and protective factors of sexual minority well-being has therefore received increased attention in research (e.g., Mustanski & Macapagal, 2023; Weststrate et al., 2024).

Life satisfaction, a component of subjective well-being, reflects an individual's global evaluation of the quality of their life (Diener et al., 1985). Greater life satisfaction has strong implications for people's livelihoods, including greater occupational success and better physical and mental health (e.g., Joshanloo & Jovanović, 2021; Strine et al., 2008). However, the extant literature largely suggests that sexual minorities report lower life satisfaction compared to heterosexuals (Bartram, 2023; Bejakovich & Flett, 2018; De Miguel et al., 2018; De Vries et al., 2020; Petrou & Lemke, 2018; Powdthavee & Wooden, 2015; Semlyen et al., 2016; Tolmacz et al., 2023; Urwin et al., 2021; Yan et al., 2023). Unique, identity-based stressors (i.e., minority stressors) are thought to be a primary source of these between-group differences in life satisfaction (Meyer, 1995, 2007). Moreover, minority stress is also theorized to explain life satisfaction differences among sexual minorities as a function of exposure (Meyer, 2003). As such, determining the robustness of various minority stressors in samples of sexual minorities helps identify minority stressors that may be especially potent targets for policy. Yet, many studies typically examine minority stressors separately, which leaves open questions about (1)

their robustness compared to other minority stressors and more general stress, and (2) the factors that may moderate the effects of minority stress.

In this study, we conducted a multiverse analysis to examine the robustness of the association between five minority stressors on life satisfaction in a sample of sexual minority adults from the United States. We additionally examined the moderating role of three theorized resilience factors and intersectional group identities in the effects of minority stressors. In the following sections, we discuss minority stress theory and its implications for sexual minority well-being.

Minority Stress Theory

Minority stress theory is the predominant theoretical framework used to explain well-being disparities for sexual minorities (Frost & Meyer, 2023). Minority stressors refer to social stressors rooted in stigma that reflect interpersonal and structural (i.e., external minority stressors) as well as intrapersonal (i.e., internal minority stressors) sources (Meyer, 2003). For example, sexual minorities are more likely to experience acts of violence because of their sexual identity (external minroity stress; Flores et al., 2022) and are at greater risk of internalizing negative feelings about their identity (internal minority stress; Herek et al., 2009). Minority stress theory argues that although minority stressors are unique to those with marginalized identities, they work similarly to general stressors (i.e., stressors experienced by everyone regardless of identity) in negatively affecting life satisfaction. In other words, minority stressors act as *additional* burdens of stress to overall stress levels (see Figure 1; Meyer, 2003).

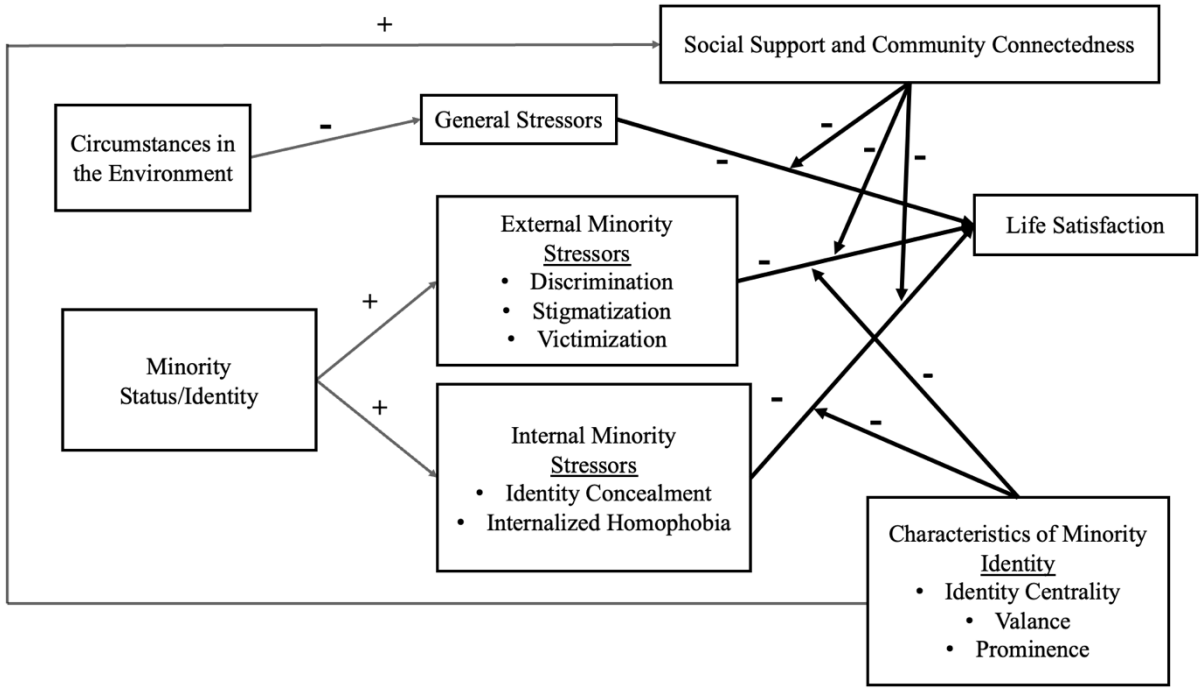

Figure 1. The theoretical model of minority stress theory was proposed by Meyer (2003). Plus (+) and minus (-) signs indicated the expected, theoretical direction of effects. Bolded, darker arrows indicate the pathways tested in this study. While characteristics of minority identity are not theorized to moderate general stress, we still examined them as moderators in our models.

Moreover, sexual minorities who experience more minority stress are theorized to report lower levels of life satisfaction compared to those who report less frequent minority stress (Meyer, 2007). While previous research supported these claims (e.g., Bränström & Pachankis, 2021; Huang & Chan, 2022; Roberts et al., 2024; Van Der Star et al., 2021), most studies only looked at one specific minority stressor in isolation. A multiverse analysis of various minority stressors on life satisfaction among sexual minorities has two important implications. First, it tests the robustness of different minority stressors, which can inform policy changes by identifying the stressors that are the most potent at the population level. Second, comparing the additional contribution of various minority stressors to life satisfaction when accounting for general stressors provides a test of the stress accumulation hypothesis within minority stress theory. In this study, we tested the robustness of associations between five minority stressors and life satisfaction while accounting for general stress. We specifically examined three external (discrimination, stigmatization, victimization) and two internal (internalized homophobia, identity concealment) minority stressors in this study. We briefly review previous findings of the association between these minority stressors and life satisfaction below.

External Minority Stressors

We examined the effects of three external minority stressors: discrimination, stigmatization, and victimization. Discrimination is the intentional act of treating someone with less respect or insulting them because of their identity (Williams et al., 1997). Stigmatization reflects negatively biased attitudes of sexual minorities by others and society (Herek, 2009). Finally, victimization refers to violent acts against someone (i.e., physical assault, theft; Flores et al., 2022). Previous research found a clear link between lower life satisfaction and greater stigmatization (e.g., Hatzenbuehler, 2016; Perales & Todd, 2018; Van Der Star et al., 2021) and

victimization (e.g., Nguyen et al., 2016; Petrou & Lemke, 2018; Van Der Star et al., 2021). However, the effects of discrimination are mixed (e.g., Barry et al., 2022; Cramer et al., 2017; Van Der Star et al., 2021) which may reflect the notion that external stressors influence well-being indirectly through internalization of negative feelings after these events. In line with minority stress theory and previous research, we expected sexual minorities who experienced greater external minority stress to report lower life satisfaction.

Internal Minority Stressors

We additionally examined two internal minority stressors: internalized homophobia and identity concealment. Internalized homophobia refers to an individual's negative attitudes toward their sexual identity (Herek et al., 2009). Identity concealment refers to the process and decision of when and to whom to hide one's sexual identity (Meyer et al., 2002). There is clear evidence that sexual minority adults who report greater internalized homophobia report lower overall satisfaction with life (e.g., Conlin et al., 2019; Gómez et al., 2022; Petrou & Lemke, 2018; Ummak et al., 2023). The link between identity concealment and life satisfaction, however, is more complicated. While coming out helps create a stable sense of self across contexts (Kranz & Pierrard, 2018), it can also result in social rejection (Ryan et al., 2015; Solomon et al., 2015). Deciding who to come out to can therefore be stressful as people weigh whether disclosing their sexual identity will impact their safety and current relationships (Conlin et al., 2019). The complex nature of sexual identity concealment is reflected in the literature as varying effects on life satisfaction have been found (Anderson & Randlet, 1993; Bejakovich & Flett, 2018; De Miguel et al., 2018; Pachankis & Bränström, 2018; Wong & Tang, 2003). We still expected that greater internalized homophobia and greater identity concealment would be negatively associated with life satisfaction.

In sum, minority stress theory provides a framework for understanding the life satisfaction of sexual minorities as a function of minority stress. We expected 1) that sexual minority adults who reported greater minority stress would report lower life satisfaction and 2) that minority stress would explain additional variation in life satisfaction when accounting for general stress. While minority stress is theorized to negatively impact life satisfaction, these effects may be bolstered or diminished as a function of social relationships and characteristics of minority identity (see Figure 1). Investigating potential moderators is therefore not only useful for contextualizing sexual minority well-being but can inform policy decisions.

Moderators of the Effects of Minority Stress on Life Satisfaction

Minority stress theory suggests that the adverse effects of minority stressors may be enhanced or dampened depending on various life and societal circumstances (Meyer, 2003, 2015; Parmenter & Barrita, 2024). As displayed in Figure 1, supportive relationships (e.g., social support and LGBTQ+ community connectedness) should buffer against general and minority stress. Similarly, the integration of sexual identity into one's self-concept (i.e., sexual identity centrality) and society (e.g., views of intersecting identities) should also differentially influence the impacts of minority stress. We examined the moderating role of these factors on the associations of minority stress. We discuss these theoretical considerations and empirical findings below.

Social Support and LGBTQ+ Community Connectedness

Minority stress theory integrates social buffering hypotheses into its framework, which suggests that supportive relationships can mitigate the negative effects of stress by promoting positive coping strategies (Cohen & Wills, 1985). Indeed, there is evidence that receiving more social support reduces the impact of minority stressors on life satisfaction (Huang & Chan, 2022;

La Roi et al., 2022; Leahy & Chopik, 2020; Wong & Tang, 2003). Additionally, feeling connected to other members of the LGBTQ+ community is possibly a more potent form of social support given shared identities and experiences (Frost et al., 2022). The existing evidence suggests that feeling more connected to the LGBTQ+ community buffered the effects of minority stress (Frost et al., 2016; Frost & Meyer, 2012; Sattler et al., 2016). We therefore expected that greater social support and LGBTQ+ community connectedness would be protective factors against minority stress.

Sexual Identity Centrality

Coming to terms with one's minoritized sexual identity can be a significant source of stress (Meyer, 2003). Cognitive dissonance processes that separate one's sexual identity from their sense of self can lead to further identity conflicts that over time result in lower life satisfaction (Ghavami et al., 2011). Reaffirming one's sexual identity instead promotes positive identity development, which boosts life satisfaction (Cain, 1991). Therefore, greater sexual identity centrality may protect against minority stress because it prevents internalization of negative feelings about their sexual identity (Kranz & Pierrard, 2018). Whiel limited, the available research found that greater sexual identity centrality protected against minority stress satisfaction (Bejakovich & Flett, 2018; Górska et al., 2023; Wong & Tang, 2003). In this study, we explored whether sexual identity centrality buffered against the impacts of minority stress.

Group Differences

Finally, sexual minorities with intersecting marginalized identities may experience differences in the frequency and kinds of minority stressors they experience (e.g., Flores et al., 2022; Parmenter & Barrita, 2024). We therefore explored whether different age groups (young,

middle, and older adults), sexual identities (homosexual, bisexual, plurisexual/asexual), and racial/ethnic groups (White, Black, Latine) were differentially impacted by minority stress.

Age. Recent social changes may explain age differences in the impacts of minority stress. Older sexual minority adults lived in a time of low social acceptance, making minority stressors more pervasive (Fredriksen-Goldsen et al., 2015; Frost et al., 2022; Hammack et al., 2018). Historical differences in social acceptance raise questions about whether adaption or sensitization processes may affect how minority stressors influence well-being. Older sexual minority adults may be better equipped to handle current experiences of minority stress because of repeated exposure when they were younger (Frost et al., 2022). On the other hand, more frequent minority stress could result in greater sensitization to future exposures (Semlyen et al., 2016). While research on age differences is scarce, the available evidence suggests that minority stress does not differentially affect life satisfaction across age groups (Bränström et al., 2022).

Sexual Identity. Much of the research on minority stress is with predominantly homosexual samples, leading to a lack of representation of other sexual identities in this research (Copulsky & Hammack, 2023). While research is being more inclusive in sexual identity (Frost & Meyer, 2023), differences across sexual identities may emerge because of additional stigmatization from within the queer community (e.g., Fredriksen-Goldsen et al., 2014; Thöni et al., 2022). For example, bisexual people often experience biphobia for being considered "too afraid to come out as gay" (e.g., Feinstein et al., 2023). However, it remains an active area of research on whether the effects of minority stress are differentially experienced across different sexual identities.

Race/Ethnicity. Sexual minority people of color are more likely to experience minority stress because of how systems of oppression and society respond to their multiple marginalized

identities (Cyrus, 2017; Flores et al., 2022). Theoretical adaptations of minority stress theory highlight that minority stress processes may therefore differ across racial and ethnic groups depending on which minority identity is the basis for the stressor (Everett et al., 2019; Parmenter & Barrita, 2024). The existing research suggests that sexual minorities of color do experience greater minority stress compared to White sexual minorities, which in turn results in stronger, more negative links to well-being (e.g., Barrita et al., 2023). In sum, there may be differential impacts of minority stress on life satisfaction between different groups of sexual minorities. Given the limited research across identities, we explored whether there were differences in the effects of minority stress across these groups.

The Present Study

The primary goals of this study were to test the assumptions of minority stress theory for life satisfaction and determine the robustness of various minority stressors. We used data from a large study of American sexual minority adults to test the following hypotheses. We expected (H1A) that all five minority stressors would be uniquely and negatively associated with life satisfaction, (H1B) and that minority stressors would explain additional variance in life satisfaction when accounting for general stress. We also examined different sets of theoretical moderators of minority stress. We expected that (H2A) greater social support and (H2B) greater LGBTQ+ community connectedness would buffer against minority stress and explored whether (H2C) sexual identity centrality buffered minority stress. Finally, we explored whether sexual minorities with different identities had differential associations of minority stress and life satisfaction across (H3A) age, (H3B) sexual identity, and (H3C) race/ethnicity.

Methods

All code, results, and supplementary materials for this study are provided on the project's OSF page (https://osf.io/kp3vy/?view_only=d99ab91941a54611b1e459dddeddec30).

Data & Participants

Data came from the Generations study (Meyer et al., 2020), which surveyed a probability sample of sexual minority adults in the United States. Participants were recruited into the study if they fell into specific birth years (1956-1966, 1974-1984, and 1989-1999) to create three different birth cohorts to capture the effects of social change for sexual minorities. One previous study using this data examined life satisfaction differences between younger and older sexual minorities (Russell et al., 2022). However, that study did not examine the influence of these minority stressors on life satisfaction. More information about the Generations study, its recruitment and exclusion procedures, and previous studies using the data can be found on the study's website (http://www.generations-study.com/). A total of 1518 participants provided data. Participants who identified as both cisgender and heterosexual (n = 11) were removed given the focus of this study, resulting in a final sample size of n = 1507. Table 1 provides a breakdown of the demographic characteristics for the overall sample and for each age group, as is typical for studies using the Generations dataset.

Measures

A full list of the study measures is available on the Generation study's website (http://www.generations-study.com/methods; Krueger et al., 2020). Descriptive information for all relevant study measures, including raw means and standard deviations, Cronbach's alphas, McDonald's total omegas, and zero-order Pearson's correlations are provided in Table 2. We detail the specific measures used in this study below.

Table 1.
Sample demographics by age group

			Sexual Identity			Gender Identity			Racial/Ethnic Identity		
Age Group	n	Mean Age (SD)	Gay/Lesbian	Bisexual	Other Sexual Identity	Male	Female	Genderqueer / Non-Binary	White	Black	Latine
Young	664	22.14 (2.37)	37.05%	45.63%	17.32%	37.35%	53.46%	9.19%	54.67%	18.52%	26.81%
Middle	369	37.37 (2.32)	55.28%	33.60%	11.11%	44.44%	50.95%	4.61%	63.14%	18.43%	18.43%
Older	474	56.00 (2.34)	80.80%	13.92%	5.27%	54.85%	41.77%	3.38%	80.38%	9.28%	10.34%
Overall	1507	36.52 (14.71)	55.28%	32.71%	12.01%	44.59%	49.17%	6.24%	64.83%	15.59%	19.58%

Life Satisfaction

The 5-item Satisfaction with Life Scale (Diener et al., 1985) was administered to assess global life satisfaction. Participants rated items on a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Example items included: *"*In most ways, my life is close to ideal," "I am satisfied with life," and "So far I have gotten the important things I want in life." Internal consistency was high as indicated by $\alpha = 0.91$ and $\omega = .91$.

Minority Stressors

Discrimination. Participants reported their experience with minor acts of discrimination based on their sexual orientation over the past year on a 4-point Likert scale using the Everyday Discrimination Scale (Williams et al., 1997). Items included "You were treated with less courtesy than other people," "You were treated with less respect than other people," and "You were called names or insulted." Participants rated how often they experienced these forms of discrimination on a 4-point Likert scale from 1 (*often*) to 4 (*never*). All items were reverse-coded so that larger values reflected greater reports of discrimination. Both α and ω were 0.91.

Felt Stigma. The Felt Stigma Scale (Herek, 2009) assessed respondents' awareness and experiences of minority stress to expectations of rejection and devaluation. Participants were asked to rate items such as "Most people where I live think less of a person who is LGB," and "Most employers where I live will hire openly LGB people if they are qualified for the job" on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). We reverse-scored relevant items so that higher values represented greater felt stigmatization. For this scale, $\alpha = .70$ and $\omega = .72$.

Table 2.

Study variable means, standard deviations, internal consistencies, and intercorrelations

				Pearson's Correlation (*r*)								
Variable	Mean	SD	α / ω	1	2	3	4	5	6	7	8	9
1. Life Satisfaction	4.33	1.63	.91 / .91									
2. Discrimination	1.91	0.69	.91 / .91	**-.34*** **								
3. Felt Stigmatization	2.66	0.94	.70 / .72	**-.28*** **	**.29*** **							
4. Victimization	1.96	0.81	.83 / .83	**-.21*** **	**.42*** **	**.21*** **						
5. Internalized Homophobia	1.62	0.75	.77 / .79	**-.18*** **	**.16*** **	**.21*** **	.01					
6. Sexual Identity Concealment	1.00	0.93	.86 / .86	**-.16*** **	**.10*** **	**.22*** **	**-.06***	**.25*** **				
7. General Stress	1.57	0.33	.64 / .64	**-.47*** **	**.46*** **	**.23*** **	**.28*** **	**.22*** **	**.20*** **			
8. Perceived Social Support	5.20	1.30	.93 / .93	**.44*** **	**-.19*** **	**-.23*** **	**-.14*** **	**-.19*** **	**-.13*** **	**-.30*** **		
9. LGBTQ+ Community Connectedness	2.97	0.56	.86 / .86	**.08*** **	.04	-.05	.04	**-.19*** **	**-.18*** **	-.05	**.16*** **	
10. Sexual Identity Centrality	3.95	1.12	.83 / .84	-.01	.05	.00	**.07***	**-.14*** **	**-.24*** **	-.02	.03	**.46*** **

Note. * $p < .05$. ** $p < .01$. ***$p < .001$. α = Cronbach's alpha. ω = McDonald's total omega.

Victimization. Participants completed a six-item measure that assessed the frequency of victimization experienced because of their sexual orientation since the age of 18 (Herek, 2009). Participants responded to items such as "being hit," "being beaten," and "someone threw an object at you" on a 4-pont Likert scale from 1 (*never*) to 4 (*three or more* times). Both α and ω were .83 for this scale.

Internalized Homophobia. Internalized homophobia was assessed using the Internalized Homophobia Scale (Herek et al., 2009) on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Items included: "I have tried to stop being attracted to people who are the same sex as me," "I wish I weren't LGB," and "I feel that being LGB is a personal shortcoming for me." For this scale, α = .77 and ω = .79.

Sexual Identity Concealment. Participants rated their level of outness across various relationships on a 4-point Likert scale from 1 (*out to none*) to 4 (*out to all*) (Meyer et al., 2002). These relationships included: family, straight friends, co-workers, and healthcare providers. Both α and ω were .86 for this scale.

General Stress

We used the abridged version of the Chronic Strains Scale (Wheaton, 1999) to capture general stressors. Participants responded to 12 items on a 3-point Likert scale from 0 (*not true*) to 2 (*very true*). Example items included: "You're trying to take on too many things at once," "You wonder if you will ever find a partner or spouse," "You are alone too much," and "You have a lot of conflict with your partner/boyfriend/girlfriend." Internal consistencies for α and ω were both .64.

Perceived Social Support

The Perceived Social Support Scale (Zimet et al., 1988) was used to measure participants' feelings of social support from family, friends, and significant others. On a 7-point Likert scale from 1 (*very strongly disagree*) to 7 (*very strongly agree*), participants responded to items such as "My family really tries to help me.", "I can count on my friends when things go wrong.", and "There is a special person with whom I can share my joys and sorrows." For this scale, $\alpha = .93$ and $\omega = .94$.

LGBT Community Connectedness.

An adapted version of LGBT Community Scale (Frost & Meyer, 2012) was used to assess participants' feelings of connection to the LGBT community. Seven of the eight original items were included in the study, including "You feel you're a part of the LGBT community" and "You are proud of the LGBT community." Responses were recorded on a 4-point Likert scale ranging from 1 (*agree strongly*) to 4 (*disagree strongly*). Appropriate items were reverse-coded so that higher scores represented greater community connectedness. Both α and ω were .86 for this scale.

Sexual Identity Centrality

Participants reported how central their sexual identity was to their self-concept using a 5-item subscale of Mohr and Kendra's (2011) Lesbian, Gay, and Bisexual Identity Scale. Participants responded to each item on a 6-point Likert scale from 1 (*disagree strongly*) to 6 (*agree strongly*). Examples of items include: "My sexual orientation is an insignificant part of who I am" and "Being an LGB person is a very important aspect of my life". For this scale, $\alpha = .83$ and $\omega = .84$.

Age Group

Participants were asked to provide the year they were born and their age. Age group designation was predetermined by the Generations study team using participants' reported age. We followed the grouping done in previous studies using this data (Frost et al., 2022; la Roi et al., 2022; Russell et al., 2022). Participants who were born between 1989-1999 (ages 18-27 at the time of the study) were placed into the Younger adult cohort (1), participants born between 1974-1984 (ages 32-43) were placed into the Middle adult cohort (2), and participants born between 1956-1966 (ages 50-61) were a part of the Older adult cohort (3). Cohort designations were used to represent the experiences and societal changes of different sexual minority adults (Meyer et al., 2020).

Sexual Identity

Participants were asked to report their sexual identity. Participants were included in the study if they identified as a sexual minority. Identities included gay, lesbian, bisexual, asexual, pansexual, queer, or questioning. We classified responses into three groups for homosexual (1; lesbian or gay), bisexual (2), and combined all other sexual identities such as pansexual, asexual, questioning as other sexual minority identity (3) because of small sample sizes for each group.

Race/Ethnicity

Participants were asked to report their racial/ethnic identity. Participants reported whether they identified as White (1), Black (2), and Latine (3). Participants who identified as another racial or ethnic group and did not also identify as White, Black, or Latine, were removed from the Generations study because of small sample sizes.

Analyses

All analyses were conducted in R (Version 4.4.3; (R Core Team, 2025) using the *dplyr*, *lavaan*, *psych*, *semTools*, and *specr* packages (Jorgensen et al., 2022; Masur & Scharkow, 2020; Revelle, 2024; Rosseel, 2012; Wickham et al., 2023).

Measurement Models and Measurement Invariance

We used structural equation modeling to conduct Confirmatory Factor Analysis (CFA) models for all continuous variables. We deemed measurement models of good fit if Confirmatory Fit Index values (CFI) > .95 and Root Mean Square Error Approximation (RMSEA) < .08 per the recommendation of Hu and Bentler (1999). If models did not meet these criteria, we allowed for dependencies between items and trimmed any poorly functioning items. If measurement models still did not reach our fit criteria, we noted this as a limitation and used the raw averaged scores. We standardized all scores for use in the specification curve models.

We additionally tested life satisfaction and all stress variables for measurement invariance across age groups, sexual identity, and racial/ethnic groups. We tested all variables for configural, metric, and scalar measurement invariance to ensure items worked similarly within groups. For configural invariance, we examined whether items loaded onto the intended factor structure and whether they were similar across these groups. For metric invariance, we constrained item factor loadings to be equivalent across all groups. Finally, we tested for scalar invariance by constraining item intercepts across groups to equality. Model comparisons for measurement invariance were assessed by comparing changes in RMSEA and CFI, with changes in both indices $\leq |.01|$ indicating measurement invariance (Cheung & Rensvold, 2002). If these measurement models did not meet metric or scalar invariance, we allowed for partial invariance so long as most item loadings and intercepts were the same across groups (Widaman et al., 2010). If we still could not establish invariance, we looked for any poorly functioning items and

reexamined measurement models accordingly. For any stressor variable that continued to be noninvariant, we interpreted effects with caution and noted this as a limitation of our study.

Specification Curve Analysis

We used specification curve analysis to conduct our main multiverse analyses. A primary advantage of specification curve analysis estimates is the ability to run numerous multiple linear regression models using various combinations of predictors across different groups (Simonsohn et al., 2020). Therefore, we can estimate the main effect of each minority stressor and the adjusted effect when considering all possible combinations of minority stressors and general stress. Main effects for each stressor were considered significant at $p < .05$. As a robustness check, we took the average of all estimated effect sizes and the resulting confidence intervals from all models with and without controlling for all combinations of stressor variables. We considered these adjusted effect sizes significant if none of the confidence intervals contained zero. To assess our power to detect small to large effects, we used the function *WebPower* (Zhang & Mai, 2023), which indicated that we had greater than .97 power to detect small effects across all models.

For our first set of analyses, we examined the robustness of the effects of all minority stressors on life satisfaction. We expected each minority stressor to negatively predict life satisfaction and remain significant even when adjusting for all other minority stressors and general stress (H1A). We then examined whether the minority stressors explained additional variance in life satisfaction above that of more general stress by examining the change in R^2 for these models. We expected the addition of minority stressors to explain additional variance in life satisfaction when in models with general stress (H1B).

In our next set of analyses, we tested whether social support, LGBTQ+ community connectedness, and sexual identity centrally moderated the effects of all stressors on life satisfaction. We ran new models that included interaction terms for each moderator and minority stressor across the three different specification curves. We expected social support and LGBTQ+ community connectedness to buffer against the effects of all stressors and explored whether sexual identity centrality also moderated these effects.

Lastly, we examined whether different groups (age, sexual identity, race/ethnicity) of sexual minority adults differed in how minority stressors affected life satisfaction. We reran three separate specification curve models for each grouping variable. We explored whether groups differed in these effects and considered groups to differ if any of the estimated confidence intervals for a particular stressor did not overlap with one another.

Results

Measurement Models

All measurement models for continuous variables were examined in *lavaan* (Rosseel, 2012). We considered models of good fit if CFI values > .95 and RMSEA values < .08 (Hu & Bentler, 1999). The fit indices of all measurement models can be found in Table S1. Majority of our models met criteria for good fit after introducing inter-item correlations (see our study codebook for these items for their specific measures). There were three exceptions to this. For discrimination (CFI = .969, RMSEA = .082) and LGBTQ+ community connectedness (CFI = .984, RMSEA = .081), we accepted the fit of these models given how close the RMSEA values were to our cutoff. The fit of the general stress measure, however, was poor (CFI = .566, RMSEA = .103). After examining the items, we decided that a reflective model may not best capture the structure of general stress, as item content varied across the types of stressors. We

therefore used the average of the observed score for general stress in our specification curve models. We therefore interpret effects for these measures with caution.

We then tested life satisfaction and all stressor variables for scalar invariance across our different comparison groups (age, sexual identity, and race/ethnicity) to ensure they functioned similarly within groups. Table S2-S4 provides the results from the measurement invariance analyses. Roughly 44% of measurement models met scalar measurement invariance or partial scalar measurement invariance. Given that less than half met (partial) scalar invariance, we allowed for measures to have metric or partial metric invariance. Our codebook in our supplementary materials details which item loadings/intercepts were freed for partial metric and partial scalar invariance. Items that were freed may track with important differences in item responding across groups. For example, the discrimination item "You received poorer service than other people at restaurants or stores" was freed for age groups, which may reflect the lived experiences of sexual minorities who lived in times of less social acceptance. Notably, five measurement models did not meet metric invariance. Specifically, life satisfaction was noninvariant across sexual identities and racial/ethnic groups; internalized homophobia was noninvariant across age groups and sexual identities; and sexual identity concealment was invariant across age and racial/ethnic groups. Given the goals of the study, we still used the standardized factor scores for these measures, but interpret these group comparisons with caution.

The Robustness of Minority Stressors

For our main analyses, we used specification curve analysis to run multiple linear regression models to determine whether minority stressors were robustly and negatively associated with life satisfaction (H1A) and explained additional variance in life satisfaction

(H1B). Figure 1 and Table S5 provide both the main and adjusted standardized effect sizes for each stressor. Regarding main effects, all stressor variables were negatively associated with life satisfaction (p's < .001). When adjusting for all possible combinations of stressors, only discrimination (b_{avg} = -.20, Range = -.36 to -.08, 95% $CI_{Min\&Max}$ [-.42, -.02]), felt stigmatization (b_{avg} = -.17, Range = -.30 to -.09, 95% $CI_{Min\&Max}$ [-.36, -.03]), sexual identity concealment (b_{avg} = -.09, Range = -.17 to -.05, 95% $CI_{Min\&Max}$ [-.23, -.00]), and general stress (b_{avg} = -.46, Range = -.51 to -.43, 95% $CI_{Min\&Max}$ [-.55, -.38]) remained significant. Thus, we found some support for our hypothesis, such that 3/5 minority stressors were robustly associated with life satisfaction.

We then determined whether minority stressors explained additional variance in life satisfaction compared to general stress. We used the R^2 values from models with only each stressor to examine the amount of variance explained. General stress explained about 28% of the variance in life satisfaction as a singular predictor. Across all five stressors, minority stressors accounted for an additional .02% (identity concealment) to 12% (discrimination) of the variance in life satisfaction (see Table S5). These results indicate that minority stressors do explain meaningful variance in life satisfaction but varies across stressors.

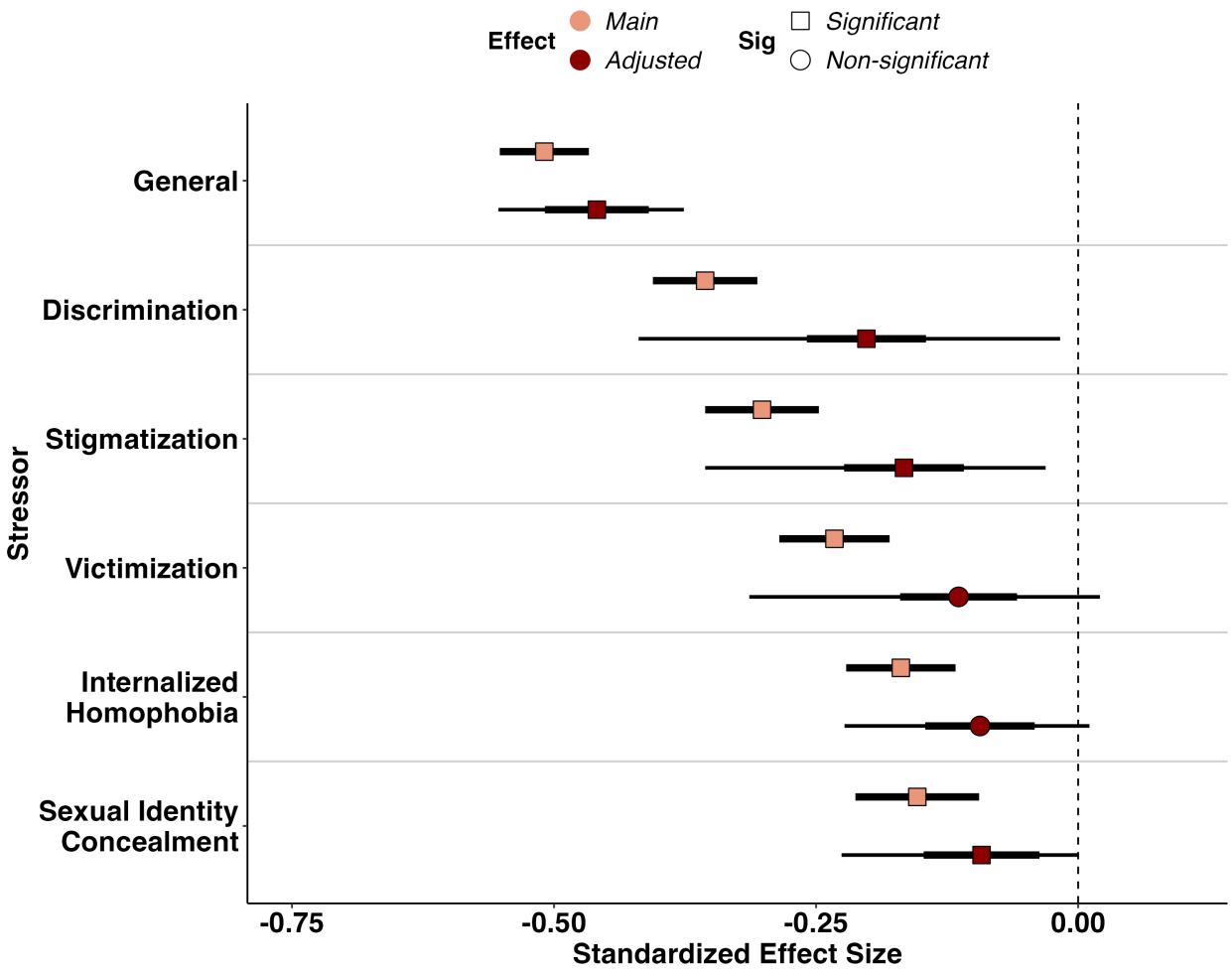

Figure 1. Standardized main and adjusted effects of stressors on life satisfaction.

Moderators of Minority Stress

Minority stress theory argues that several moderators across social support/connectedness and characteristics of minority identity can buffer or exacerbate the effects of minority stress. In this study, we expected that greater social support and LGBTQ+ community connectedness would buffer against minority stress. For characteristics of minority identity, we explored the buffering role of sexual identity centrality and whether different groups of sexual minorities were differentially impacted by minority stressors.

Social Support and LGBTQ+ Community Connectedness

We examined whether greater perceived social support and LGBTQ+ community connectedness buffered against minority stress. We included these moderators and interaction terms as predictors in separate specification curve models. As a predictor, greater perceived social support was associated with higher levels of life satisfaction (b = .35, 95% CI [.31, .39], p < .001), even when adjusting for the other stressors (b_{avg} = .27, 95% $CI_{Min\&Max}$ [.18, .39], Range = .22 to .35). The main effect of LGBTQ+ community connectedness was also positive and significant (b = .10, 95% CI [.05, .15], p < .001), but became nonsignificant when adjusting for the other predictors (b_{avg} = .07, 95% $CI_{Min\&Max}$ [-.02, .16], Range = .04 to .11). Contrary to our expectations, however, we found no evidence that greater perceived social support or LGBTQ+ community connectedness buffered against the effects of minority stress (see Table S6 and Figure S1).

Sexual Identity Centrality

We followed the same logic for our models of social support and LGBTQ+ community connectedness for sexual identity centrality. We found that sexual identity centrality was unrelated to life satisfaction (main effect: b = -.02, 95% CI [-.07, .04], p = .521; adjusted effect:

b_{avg} = -.01, 95% $CI_{Min\&Max}$ [-.13, .07], Range = -.07 to .02). Similar to the support variables, there were no moderation effects of sexual identity centrality for any of the stressors (see Table S6 and Figure S1).

Differential Impacts of Minority Stressors across Groups

Lastly, we examined whether different groups of sexual minority identities (age groups, sexual identities, and racial/ethnic groups) experienced differential impacts of minority stressors on life satisfaction. For these analyses, we reran specification curve models for each grouping variable separately. Table S7 and Figures S2-S4 provide the standardized effect sizes for the effects of each stressor on life satisfaction for each group. While several differences emerged within groups for the main effects, no differences were found when accounting for all other stressors. Therefore, age groups, sexual identities, and racial/ethnic groups were not differentially impacted by minority stressors.

Discussion

Sexual minorities are theorized to report lower life satisfaction as a function of minority stress. Minority stress proposes that minority stressors should robustly predict lower life satisfaction, and that several factors across support and identity acceptance can influence the degree of these effects. Yet, previous studies typically study only one minority stressor and one moderator, leaving questions about the robustness of these stressors in comparison to other minority stressors and more general stress. In the present study, we aimed to fill this gap by testing the robustness of five minority stressors and several theoretical moderators using specification curve analysis. There were four main findings: 1) 3/5 minority stressors were negatively associated with life satisfaction, 2) minority stressors explained additional variance in life satisfaction compared to general stress, 3) perceived social support, LGBTQ+ community

connectedness, and sexual identity centrality did not moderate the effects of minority stress, and 4) different groups of sexual minorities similarly experienced the impacts of minority stressors. However, given concerns with our measurement models and measurement invariance, we interpret these findings with caution. We discuss our findings below.

Some Minority Stressors are Robustly Associated with Life Satisfaction

According to minority stress theory, the effects of minority stress transcend across many domains of sexual minority adults' lives, including their well-being (Meyer, 2003). Minority stressors are theorized to act as additional sources of stress, thereby increasing overall levels of stress that explain why sexual minorities report lower life satisfaction (Meyer, 2007). Among sexual minorities, greater amounts of minority stress are also theorized to explain individual differences in life satisfaction. However, the robustness of various minority stressors is still an active area of research, as many studies have typically examined one minority stressor in isolation. Testing the robustness of different minority stressors together and with more general stress can be informative of policy by identifying the stressors that appear most important compared to other stressors.

In this study, we used specification curve analysis to conduct a multiverse analysis to determine the robustness of the effects of different minority stressors while controlling for all viable combinations of minority stressors and general stress. While all five minority stressors alone were negatively associated with and explained additional variance in life satisfaction, only three of the five minority stressors remained robustly associated with life satisfaction. Specifically, greater reports of two external (discrimination, stigmatization) and one internal (sexual identity concealment) minority stressors predicted lower life satisfaction when accounting for all the different combinations of stressors. These findings support previous work

of stigmatization (Hatzenbuehler, 2016; Perales & Todd, 2018; Van Der Star et al., 2021) and contribute to the literature on the effects of discrimination (Barry et al., 2022; Cramer et al., 2017; Van Der Star et al., 2021) and sexual identity concealment (Anderson & Randlet, 1993; Bejakovich & Flett, 2018; De Miguel et al., 2018; Wong & Tang, 2003). Regarding sexual identity concealment, this effect should be considered in the context of the United States, as previous work suggests that identity concealment may have positive benefits in countries with less acceptance to avoid legal punishment or violence (Pachankis & Bränström, 2018; Van Der Star et al., 2021). Furthermore, our findings could provide some initial evidence for these three minority stressors as important targets for policy changes. Given that these stressors were robust in our sample, policies that more strongly criminalize discrimination or increased funding for greater visibility and resources for those who are worried about coming out may be ways for social systems to address these minority stressors. However, more research is needed in studying the stressors and the implications of them in policy.

Surprisingly, we found that victimization and internalized homophobia were not associated with life satisfaction when adjusting for all other stressors. This is somewhat surprising given previous literature highlighting the negative effects of victimization (e.g., Nguyen et al., 2016; Pachankis & Bränström, 2018; Van Der Star et al., 2021) and internalized homophobia (e.g., Conlin et al., 2019; Gómez et al., 2022; Petrou & Lemke, 2018; Ummak et al., 2023). There are a few explanations for why these effects might not have emerged here. First, it is possible that when considering other minority stressors, victimization and internalized homophobia are actually less important for life satisfaction. This may be because these two stressors are the product of other minority stressors. For victimization, it is likely that greater stigmatization leads to a higher probability of a violent attack and could be dependent on

whether someone has disclosed their sexual minority status (Flores et al., 2022; Van Der Star et al., 2021). For internalized homophobia, experiencing or witnessing discrimination or stigmatization plays a role in how people internalize negative feelings about their identity (e.g., Frost & Meyer, 2023. Controlling for other minority stressors may therefore fully explain the influence of victimization and internalized homophobia on life satisfaction. Second, null findings may be reflective of floor effects. Our data was relatively skewed to the lower end of the scale for both victimization and internalized homophobia. This study could therefore be unable to detect true effects given the skew and little variance across participants. Finally, social safety theory highlights that the effects of minority stressors may depend on whether people feel safe in their social environment (Diamond & Alley, 2022). Any experience of victimization could therefore be considered a one-off incident and therefore not influence life satisfaction (Frost & Meyer, 2023). However, little research has tested social safety theory with these stressors. Future research should link feelings of social safety to the experience of these minority stressors and continue to examine the effects of victimization and internalized homophobia on life satisfaction.

Support and Sexual Identity Centrality Do Not Moderate the Effects of Minority Stress

Minority stress theory suggests that the effects of minority stress is mitigated by strong social support and feeling connected to the LGBTQ+ community (Meyer, 2003). Additionally, how important one's sexual identity is to their self-concept may also influence how minority stressors impact life satisfaction. We found, however, that perceived social support, LGBTQ+ community connectedness, and sexual identity centrality did not moderate the impacts of minority stress. Regarding perceived social support, this finding was surprising given previous findings with minority stress and sexual minorities (La Roi et al., 2022; Leahy & Chopik, 2020). However, some studies have shown that for sexual minorities, the type of support may be what

matters. For instance, one study found that sexuality support as opposed to more general support was protective against the effects of minority stress on well-being (Doty et al., 2010). It may therefore be that for sexual minorities, specific identity-related support may be a more important factor in handling such identity-specific stressors. This is why we anticipated greater feelings of connection to the LGBTQ+ community to buffer against the effects of minority stress. Our findings may indicate that, instead, what might matter more is being supported by other sexual minority peers and friends. In other words, it may be the support from other sexual minorities who can relate to and provide relevant coping strategies to minority stress that is important to well-being, rather than feeling connected to the community at large. Our measure of LGBTQ+ community connectedness did not fully capture this type of support. Future research should aim to tease apart the type of support different people can provide in studying the impacts of minority stressors on life satisfaction.

We also found no evidence that sexual identity centrality moderated how minority stressors affected life satisfaction. Previous research has found that stronger sexual identity centrality was a protective factor (Bejakovich & Flett, 2018; Górska et al., 2023; Wong & Tang, 2003). It was unclear in these studies whether the mechanism driving these effects stemmed from cognitive dissonance or from affirming one's identity (Kranz & Pierrard, 2018). The moderating role of sexual identity centrality may therefore be a more individualized process. For instance, some people high in sexual identity centrality may not be phased by minority stress, while others may be more sensitive to these stressors as they are a threat to their identity. As such, null findings could be the result of aggregating across these processes. It is also possible that sexual identity centrality plays no moderating role. Instead, what might matter is whether someone is living authentically or being real. That is, acting according to how one feels on the inside about

their sexual minority status may mitigate the effects of minority stress (Hopwood et al., 2023). It is not so much whether their sexual identity is a core component of their identity, but rather staying true to how one feels (e.g., pride) about their identity across contexts and in the face of minority stress. As more stress and less support afford fewer opportunities to be authentic (Hopwood et al., 2023), sexual minorities who persevere and remain true to themselves may not experience the negative effects of minority stress on their well-being. As such, future research should examine the moderating role of authenticity and realness in mitigating the effects of minority stress.

Different Groups of Sexual Minorities are Impacted by Minority Stress Similarly

Lastly, stigmatized groups such as sexual minorities tend to also have other intersecting, minoritized identities (Rodriguez-Seijas et al., 2019). According to minority stress theory, such intersecting identities should influence the effects of minority stress because the integration of identities and feelings towards these intersecting identities influences the types and frequency of minority stressors. We explored whether different age groups (Young, Middle, and Older adults), sexual identities (Gay/Lesbian, Bisexual, Other Identities like Plurisexual/Asexual), and races/ethnicities (Black, Latine, White) experienced differences in the associations between minority stressors and life satisfaction. However, we found no differential associations within groups. Notably, interpretations of these effects across groups must be taken with caution, given the lack of achieving (partial) scalar invariance across multiple measures. We anticipated that sensitization or adaptation processes for older adults (Semlyen et al., 2016), more identity-specific stressors across sexual identities (Fredriksen-Goldsen et al., 2014), and more frequent exposure of minority stress across minoritized races and ethnicities across their identities (Cyrus, 2017; Flores et al., 2022) may explain potential differences in these associations. However, our

findings would suggest that while these processes may be at play, they do not lead to differential impacts on life satisfaction.

Yet, there may be other reasons behind our null findings. For starters, older adults may differ in the adaptation and sensitization processes such that some adults adapt to minority stressors while others may become sensitized. In this case, these effects would cancel each other out through aggregation and lead to no differences in comparison to other ages. Regarding different sexual identities and racial/ethnic groups, they face their own unique versions of these stressors. Bisexual and plurisexual folks may be stigmatized for their attraction to multiple genders and not simply saying they are gay (Feinstein et al., 2023). Some of our measures like internalized homophobia may have not accurately captured other identities' unique versions (e.g., internalized biphobia) and thus the differences in this type of stressor were not fully captured here. Additionally, Black and Latine sexual minorities may experience minority stressors as a result of their racial/ethnic identity, sexual identity, or the intersection of the two (Cyrus, 2017). It may therefore matter more which identity is being primed for the stressor and whether these groups differ in how minority stress gets under the skin because of the targeted identity (Everett, 2019).

Finally, our findings may also be the product of the measures used. Many of measures did not meet scalar invariance, meaning that items were interpreted differently across groups. For instance, the discrimination item, "You received poorer service than other people at restaurants or stores", was found to be noninvariant across age groups. Differential response to this item may reflect important historical differences in the acceptance and types of discrimination faced by older sexual minorities compared to younger sexual minorities. Some of our measures may therefore have item content that is more reflective of the experience of some groups versus

others. Furthermore, recent research highlights the need for measures that better capture the intersecting nature of minority stress. A recent study found that minority stress measures that captured the intersection of race/ethnicity and sexual identity were strong predictors of well-being (Parmenter & Barrita, 2024). Future research should therefore continue to examine and optimize measures that better contextualize these intersecting identities

Limitations and Constraints on Generalizability

There were numerous strengths to our study. Our large sample of sexual minorities. allowed for a well-powered examination of these effects of minority stress across multiple moderators. Additionally, our use of specification curve analysis allowed us to look across all possible combinations of stressors to capture a wide range of effect sizes. We were able to examine the robustness of these effects and prevented cherry-picking of specific results. This study was not without its limitations, however.

First, our findings only generalize to the United States. Different countries across the globe vary in their perceptions, treatment, and representation of sexual minorities (Gerber, 2020; Pachankis & Bränström, 2018). Previous research has shown that the effects of minority stressors may differ across different countries (e.g., Baiocco et al., 2023), and this context is important to understanding why certain minority stressors like sexual identity concealment are associated with greater life satisfaction (Pachankis & Bränstrom, 2018).

Second, the cross-sectional nature of our study makes it unclear what the impacts of these stressors are on life satisfaction over time. While we found evidence that some minority stressors were negatively associated with life satisfaction, we are unable to determine the temporal processes that link minority stress to life satisfaction. Future research is needed that links the role of time that minority stress theory proposes in influencing well-being (Hopwood et al., 2022).

Relatedly, we did not test potential mechanisms and processes discussed in this manuscript that explain why minority stressors impact well-being. Recent advances in experience sampling methodologies and intensive longitudinal designs can help tackle questions underlying how and why minority stressors influence sexual minority well-being (Hatzenbuehler & Pachankis, 2021). Future research should continue to examine the effects of minority stressors on life satisfaction with such approaches to elucidate these processes.

Lastly, several of our measures either did not meet our criteria for good model fit or were unable to meet our measurement invariance standard. As such, this may have impacted our findings and, therefore, warrants caution in how the findings are interpreted. Future research is needed to further examine the robustness of these stressors, as well as look across other kinds of minority stressors and theoretical moderators that may be important to understand these associations

Conclusion

Sexual minorities are faced with unique stressors that are thought to explain individual differences in life satisfaction. Minority stress theory suggests that multiple factors like support, sexual identity, and differential group experiences, may further amplify or reduce the impacts of minority stressors. In this study, we found support that minority stressors generally impact life satisfaction negatively, although only discrimination, stigmatization, and sexual identity concealment were the robust minority stressors. Additionally, we found no evidence of any effects across theoretical moderators or any group differences, highlighting a need for research to further study and identify other factors that may buffer or exacerbate the effects of minority stress. Our findings highlight that while minority stressors do negatively influence life

satisfaction, there are potential avenues for future research to explore how these effects may be impacted by various factors and processes.

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