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Minority Stress and the Life Satisfaction of Sexual Minorities

By

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DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Psychology

in the

OFFICE OF GRADUATE STUDIES

of the

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DAVIS

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Abstract

Sexual minority well-being is a growing public health concern, as many studies find that they report lower levels of well-being compared to heterosexuals. Minority stress theory, the predominant framework used to explain these differences, proposes that well-being differences emerge because sexual minorities face additional identity-based stressors that add more general stress. That is, sexual minorities face additional interpersonal (e.g., discrimination) and structural (e.g., stigmatizing policies) stress because of people and society's negative reaction to their sexual identity. Over time, heightened experiences of these stressors can result in internalizing negative feelings about one's minoritized sexual identity, resulting in further minority stress. While much research has supported the theoretical assumptions of minority stress theory, there are two broad shortcomings of the extant research. This dissertation aims to address these in two chapters.

First, much of the extant research examines minority stressors and theoretical moderators in isolation when numerous kinds co-occur and influence one another. Furthermore, at the between-person level, identifying the minority stressors that are the most robust predictors in the population can have important policy implications. Chapter 1 uses a multiverse analysis to test the robustness of the cross-sectional associations of five minority stressors with life satisfaction when accounting for other minority stressors and general stress. I additionally test several theoretical moderators and group differences, which can help contextualize the associations of the various minority stressors.

Second, there is much less research on the temporal processes that link minority stressors to sexual minority life satisfaction. As such, it leaves questions about how policy changes that reduce minority stress influence sexual minority life satisfaction over time and whether

implementation results in immediate and lasting changes. Chapter 2 examines how the implementation of marriage equality (a reduction in structural stigma) influences life satisfaction levels and slopes for sexual minorities over the span of two decades. Using a natural experiment design with piecewise multilevel growth curve models, I approximate the causal effects of marriage equality in two longitudinal panel studies from Australia and the United Kingdom by comparing life satisfaction levels and trajectories pre- and post-enactment between sexual minorities and heterosexuals.

In sum, this dissertation tests several of the assumptions of minority stress theory. This work finds that several minority stressors have robust, negative associations with life satisfaction. Furthermore, it highlights the importance of investigating temporal processes in the effects of minority stress on life satisfaction. Policy changes seem to have important implications for preventing further disparities in sexual minority well-being. Furthermore, there exist many individual differences in the effects of marriage equality that require further research to discern and contextualize how and for whom such policy changes impact life satisfaction.

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Acknowledgments

If I am honest, I have absolutely no idea how to start this. I feel like I have read so many acknowledgments to get an idea (real original), but I still feel stumped about how to best give my sincerest thanks to all the people who guided and helped me on this journey. So, I guess from here on out, you can consider this the biggest stream of consciousness that you spend at least the next page and a half reading. I cannot promise that there will not be dramatics, but, as you will see, this is just further evidence that personality is a thing.

I first want to give my thanks to the mentors who have gotten me here. My biggest and sincerest thanks go to my advisor, Emorie. Thank you will never be able to describe nor embody how grateful I am toward you and your mentorship. When you first emailed me to set a meeting to discuss working together, I was so nervous. Like so beyond nervous that I ended up rehearsing so many things to say before that meeting (none of which I think I ended up bringing up; again, personality is a thing). Looking back now, it seems sort of silly to have been so anxious. Even though you say my Neuroticism has gone down since then, I still do not quite believe it, as I am pretty sure I have displaced it to many of the project updates I know I owe you. You have opened so many doors for me, introduced me to so many great people, and guided me through so many of the ups and downs of this journey. I will always be grateful to you when I reflect back on this time.

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Okay, so by this point, I have already done a lot of crying and need a small break before thanking my friends and family. So, I dedicate this next small section to the things that got me through this journey. I first want to thank the coffee shops that I spent countless hours at getting work done. Gallery Coffee Roasters, Common Grounds (RIP), 18 grams, and Milkas have been such a staple in the countless hours writing, analyzing data, grading, etc. I also want to shout out some of the many albums that I had on repeat to get through my days in grad school: *About Time* by Sabrina Claudio, *Ready is Always Too Late* by Sinéad Harnett, *That's Showbiz*, *Baby!* by Jade Thirwall, and most certainly not to the surprise of the people who know me best, *Future Nostalgia* by Dua Lipa (the pop diva of my life). While so many songs and albums have carried me throughout this ~5.5-year journey, these albums in particular lifted my spirits, saw me get through all my program requirements, and, to be very dramatic (I am gay, what do you expect?), helped me through the darkest parts.

Now, I want to thank my friends who saw me through this journey. Thank you to the friends I made during my time in this program: Jace, Nyx, Eva, Winkie, Danielle, Rohit, and Simran. I was not sure whether I would make any friends in my program since I started in the midst of the COVID lockdown. Doing this program alongside you all has been one of the many joys of my time here. Thank you for the rants, the co-working sessions, the chisme, etc. I also extend my most heartfelt thanks to my friends who have been with me since before I started this program (or who I met along the way): Susana, Felisa, Denisse, Jen, Carlee, Abraham, Colette, Lily, Hayley, Amanda, Marzetta, Sydney, Stephanie, and Blanca. Having you cheering me from the sidelines, letting me (not) talk about school, and your friendship is something I will always be indebted to you all for. Words and actions will never, ever be able to express the love I have for you all. Thank you for being part of my chosen family.

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love and vigorous spirits to this day. I am grateful for the laughs we had, and I miss you both every single day. To my siblings, Andrew and Amanda, seeing you both grow to become the amazing people you are will always be one of the many treasures of my life. Thank you for the roasts, deep talks, and support; I love you both. Last but not least, I want to extend all my thanks and love to my mom, Ana. I was always worried about not being there during some of the hardest times of your life while here. But you so often told me now to worry and would even tell me that as my mom, you were always more concerned about my well-being. Your commitment to family and helping others is something I hope I can live up to one day. Thank you for your sacrifices to get me here. I would not be here without you, your strength, or your love. I love you to the moon and back and back again.

As you can see, this got quite wordy. I even changed the line spacing midway to make sure this did not take up too much space. I said page and a half but made it to basically three. But it would not have felt right to try and cut this down. So many people got me here today, and it would have felt like a disservice not to express all of what I had to say here. Thank you again to all those who got me here. I will forever and always be grateful. Thank you, thank you, thank you!

Chapter 1

A multiverse analysis of minority stressors and sexual minority life satisfaction

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 amount of minority stress. However, many minority stressors are often examined separately, leaving questions about the robustness of these stressors in the face of other minority stressors that likely co-occur. Similarly, the robustness of theoretical moderators (social support, community connectedness, sexual identity centrality) and the degree to which different groups of sexual minorities vary in the associations between minority stress and life satisfaction is understudied. In this study, I tested the assumptions of minority stress theory and the moderating role of the aforementioned factors in an American sample of 1507 sexual minority adults. I used specification curve analysis as a form of multiverse analysis to examine the robustness of all these associations. I found that discrimination, stigmatization, and identity concealment negatively predicted life satisfaction when adjusting for other minority stress and more general stress. However, all the proposed moderators did not significantly moderate these associations. Discussion centers around these findings of minority stress and a need to better contextualize LGBTQ+ experiences.

Introduction

Over the last decade, the number of people who identify as a sexual minority (e.g., gay/lesbian, bisexual, asexual, pansexual, questioning) 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 marginalized identity (e.g., Flores et al., 2023), which is thought to explain disparities in health and well-being (Diamond & Alley, 2022; Fingerhut, 2018; Flentje et al., 2025). 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 (I. H. Meyer, 1995, 2007). Moreover, greater experiences of minority stress are also theorized to explain life satisfaction differences among sexual minorities (I. H. Meyer, 2003). Determining the robustness of various minority stressors in samples of sexual minorities can identify the 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, I conducted a multiverse analysis to examine the robustness of the association between five minority stressors and life satisfaction in a sample of sexual minority adults from the United States. I additionally examined the moderating role of three theorized resilience factors and intersectional group identities in these associations. In the following sections, I discuss minority stress theory and previous research linking these stressors to 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 (I. H. Meyer, 2003). For example, sexual minorities are more likely to experience acts of violence because of their sexual identity (external minority 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 1-1; I. H. Meyer, 2003).

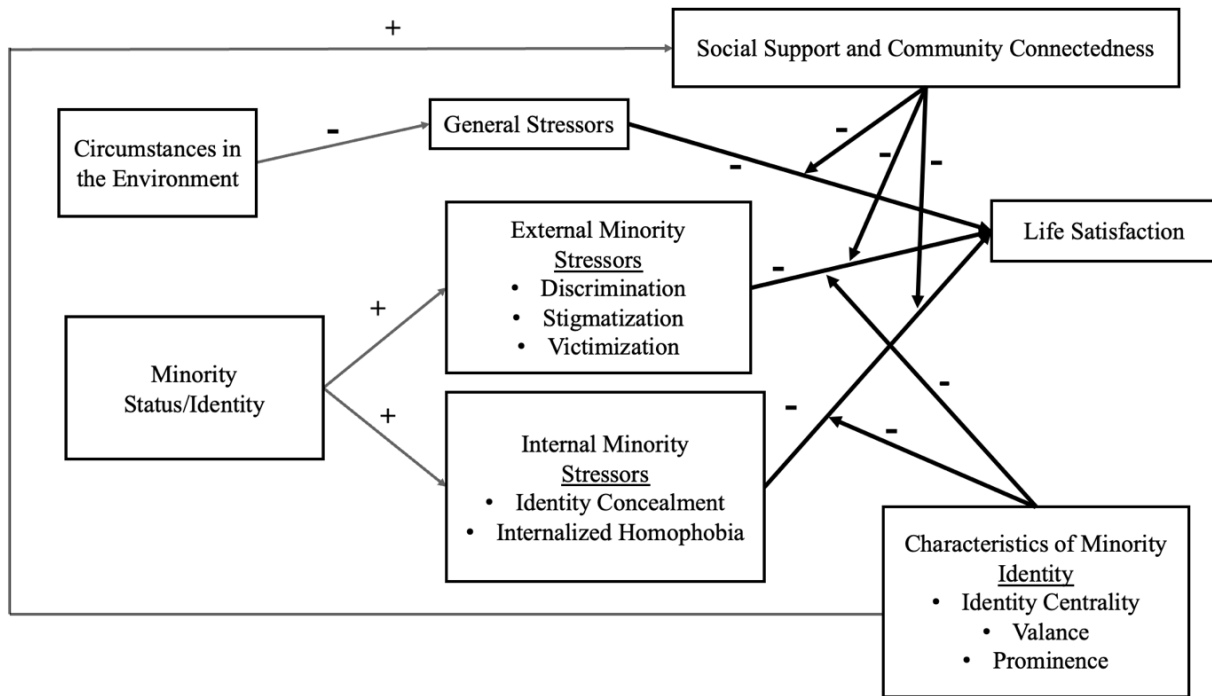


Figure 1-1. The theoretical model of minority stress theory was proposed by I. H. Meyer (2003). Plus (+) and minus (-) signs indicated the expected, theoretical direction of effects. Bolded, darker arrows indicate the pathways tested in this study. While characteristics of minority identity are not theorized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

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 the associations between life satisfaction and multiple minority stressors 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 variance explained across various minority stressors to general stress provides a test of the stress accumulation hypothesis within minority stress theory. In this study, I tested the robustness of associations between five minority stressors and life satisfaction while accounting for general stress. I specifically examined three external (discrimination, stigmatization, victimization) and two internal (internalized homophobia, identity concealment) minority stressors in this study. I briefly review previous findings of the association between these minority stressors and life satisfaction below.

External Minority Stressors

I 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 biased, negative attitudes towards 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, which may reflect some theorized pathways

that external stressors influence well-being indirectly through internalizing negative feelings about oneself after these events (e.g., Barry et al., 2022; Cramer et al., 2017; Van Der Star et al., 2021). In line with minority stress theory and previous research, I expected sexual minorities who experienced greater external minority stress to report lower life satisfaction.

Internal Minority Stressors

I 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 disclose one's sexual identity (I. H. 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). I 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. I expected 1) that sexual

minority adults who reported greater minority stress would report lower life satisfaction and 2) that minority stress would explain additional, meaningful variation in life satisfaction. 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 1-1). Investigating potential moderators is, therefore, useful for contextualizing the individual differences in the associations of minority stress.

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 (Frost & Meyer, 2023; 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. I 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 (S. 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). I 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 (e.g., I. H. Meyer, 2003). Cognitive dissonance processes that separate one's sexual identity from their sense of self can lead to further identity conflicts that 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). While limited, the available research found that greater sexual identity centrality protected against minority stress (Bejakovich & Flett, 2018; Górska et al., 2023; Wong & Tang, 2003). In this study, I 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 face (e.g., Flores et al., 2022; Parmenter & Barrita, 2024). I therefore explored whether different age groups (young, middle, and older adults), sexual identities (gay/lesbian, bisexual, plurisexual/asexual/queer/questioning), and racial/ethnic groups (White, Black, Latine) had stronger or weaker associations with 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 adaptation 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 comparisons is scarce, the available evidence suggests that there are no differential associations between minority stress and life satisfaction across age groups (Bränström et al., 2022).

Sexual Identity. Much of the research on minority stress is with predominantly gay and lesbian 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 (Feinstein et al., 2023). However, it remains an active area of research on whether these combinations of minority stressors 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; L. M. Roberts & Christens, 2021). 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 (e.g., Everett et al., 2019; Parmenter & Barrita, 2024). The existing research suggests that sexual minorities of color experience greater minority stress compared to White sexual minorities, which in turn results in stronger, more negative links to well-being (Barrita et al., 2023; L. M. Roberts & Christens, 2021). In sum, there may be differential associations between minority stress and life satisfaction within different groups of sexual minorities. Given the limited research across identities, I 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. I used data from a large study of American sexual minority adults to test the following hypotheses. I 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 compared to general stress. I also examined different sets of theoretical moderators of minority stress. I 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, I 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

Data & Participants

Data came from the Generations study (I. H. 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 1-1 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 1-2. I detail the specific measures used in this study below.

Table 1-1*Sample demographics by age group.*

Age Group	n	Mean Age (SD)	Sexual Identity			Gender Identity			Racial/Ethnic Identity		
			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*). I reverse-scored relevant items so that higher values represented greater felt stigmatization. For this scale, $\alpha = .70$ and $\omega = .72$.

Table 1-2

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

Variable	Mean	SD	α / ω	Pearson's Correlation (<i>r</i>)								
				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-point 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, $\alpha = .77$ and $\omega = .79$.

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*) (I. H. 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 the LGBT Community Scale (Frost & Meyer, 2012) was used to assess participants' feelings of connection to the LGBTQ+ 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*). Relevant 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. I adhered to these age groupings as 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 (I. H. 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. I classified responses into three groups for gay/lesbian (1), bisexual (2), and combined all other sexual identities as other sexual minority identity (3) because of small sample sizes across those groups.

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

I used structural equation modeling to conduct Confirmatory Factor Analysis (CFA) models for all continuous variables. I 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, I allowed for dependencies between items and trimmed any poorly functioning items. If measurement models still did not reach the designated fit criteria, this was noted as a limitation, and the average of the observed item scores was used. I standardized all scores for use in the specification curve models to make effect sizes comparable across stressors.

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

still not be established, any poorly functioning items were removed, and measurement models were reexamined accordingly. For any variable that continued to be noninvariant, I interpreted effects with caution and noted this as a limitation of the study.

Specification Curve Analysis

I used specification curve analysis to conduct the main 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 (i.e. a multiverse analysis; Simonsohn et al., 2020). Therefore, the main effect of each minority stressor and the adjusted effect when considering all possible combinations of minority stressors and general stress can be estimated. Main effects for each stressor were considered significant at $p < .05$. As a robustness check, I took the average of all estimated effect sizes from all models and the minimum and maximum value across the entire pool of confidence intervals. I considered these adjusted effect sizes significant if none of the confidence intervals contained zero. To assess my power to detect small to large effects, I used the *WebPower* function (Zhang & Mai, 2023), which indicated that I had greater than .97 power to detect small effects across all models.

For the first set of analyses, I examined the robustness of the associations of all minority stressors with life satisfaction. I expected each minority stressor to negatively predict life satisfaction and remain significant even when adjusting for all other minority stressors and general stress (H1A). I then examined whether the minority stressors and general stress explained meaningful variance in life satisfaction by examining the R^2 from the models with each stressor as a single predictor. I expected that minority stressors would explain additional variance in life satisfaction (H1B).

In the next set of analyses, I tested whether social support, LGBTQ+ community connectedness, and sexual identity centrality moderated the effects of all stressors on life satisfaction. I ran three sets of models that included each continuous moderator and the interaction terms between that moderator and each stressor. I expected greater social support (H2A) and LGBTQ+ community connectedness (H2B) to buffer against the effects of all stressors and explored whether sexual identity centrality also buffered these effects (H2C).

Lastly, I explored whether different age (H3A), sexual identity (H3B), and racial/ethnic (H3C) groups of sexual minority adults differed in the magnitude of the associations between minority stressors and life satisfaction. I ran three separate specification curve models for each grouping variable. I considered group differences significant 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 using *lavaan* (Rosseel, 2012). I 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 S1-1. Majority of the measurement models met the criteria for good fit after introducing inter-item correlations. There were three exceptions to this. For discrimination (CFI = .969, RMSEA = .082) and LGBTQ+ community connectedness (CFI = .984, RMSEA = .081), I accepted the fit of these models given how close the RMSEA values were to the established cutoff values. The fit of the general stress measure, however, was poor (CFI = .566, RMSEA = .103). After examining the items, I determined that a reflective model may not best capture the structure of general stress, as item content varied in capturing distinct types of general stressors. I therefore used the average of

the observed item scores for general stress in the specification curve models. Effects should therefore be interpreted with caution for these measures.

I then tested life satisfaction and all stressor variables for scalar invariance across the different comparison groups (age, sexual identity, and race/ethnicity) to ensure they functioned similarly within groups. Tables S1-2 – S1-4 provide 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, I allowed for measures to have metric or partial metric invariance. Importantly, 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 (Fredriksen-Goldsen et al., 2015; Frost et al., 2022; Hammack et al., 2018). 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. I therefore interpreted these group comparisons with caution.

The Robustness of Minority Stressors

For the main analyses, I 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 1-1 and Table S1-5 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 across all models). When adjusting for all possible combinations of stressors, only discrimination ($b_{\text{avg}} = -.20$, Range = $-.36$ to $-.08$, 95% CI_{Min&Max} [$-.42$, $-.02$]), felt stigmatization ($b_{\text{avg}} = -.17$, Range = $-.30$ to $-.09$, 95% CI_{Min&Max} [$-.36$, $-.03$]), sexual identity concealment ($b_{\text{avg}} = -.09$, Range = $-.17$ to $-.05$, 95% CI_{Min&Max} [$-.23$, $-.00$]), and general stress ($b_{\text{avg}} = -.46$, Range = $-.51$ to $-.43$, 95% CI_{Min&Max} [$-.55$, $-.38$]) remained significant. Thus, there was some support for my hypothesis, such that 3/5 minority stressors were robustly associated with lower life satisfaction.

I then determined whether each minority stressor explained additional variance in life satisfaction. General stress explained about 28% of the variance in life satisfaction. The five minority stressors accounted for an additional .02% (identity concealment) to 12% (discrimination) of the variance in life satisfaction (see Table S5-1). These results indicate that most minority stressors do explain additional, meaningful variance in life satisfaction, but varies across stressors.

Moderators of Minority Stress

Minority stress theory argues that several moderators buffer or exacerbate the effects of minority stress. I expected that greater social support and LGBTQ+ community connectedness would buffer against minority stress. I explored the buffering role of sexual identity centrality and whether there were differential associations within different groups of sexual minorities.

Social Support and LGBTQ+ Community Connectedness

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 ($b_{\text{avg}} = .27$, Range = $.22$ to $.35$, 95% CI_{Min&Max} [$.18$, $.39$]). The main effect of LGBTQ+

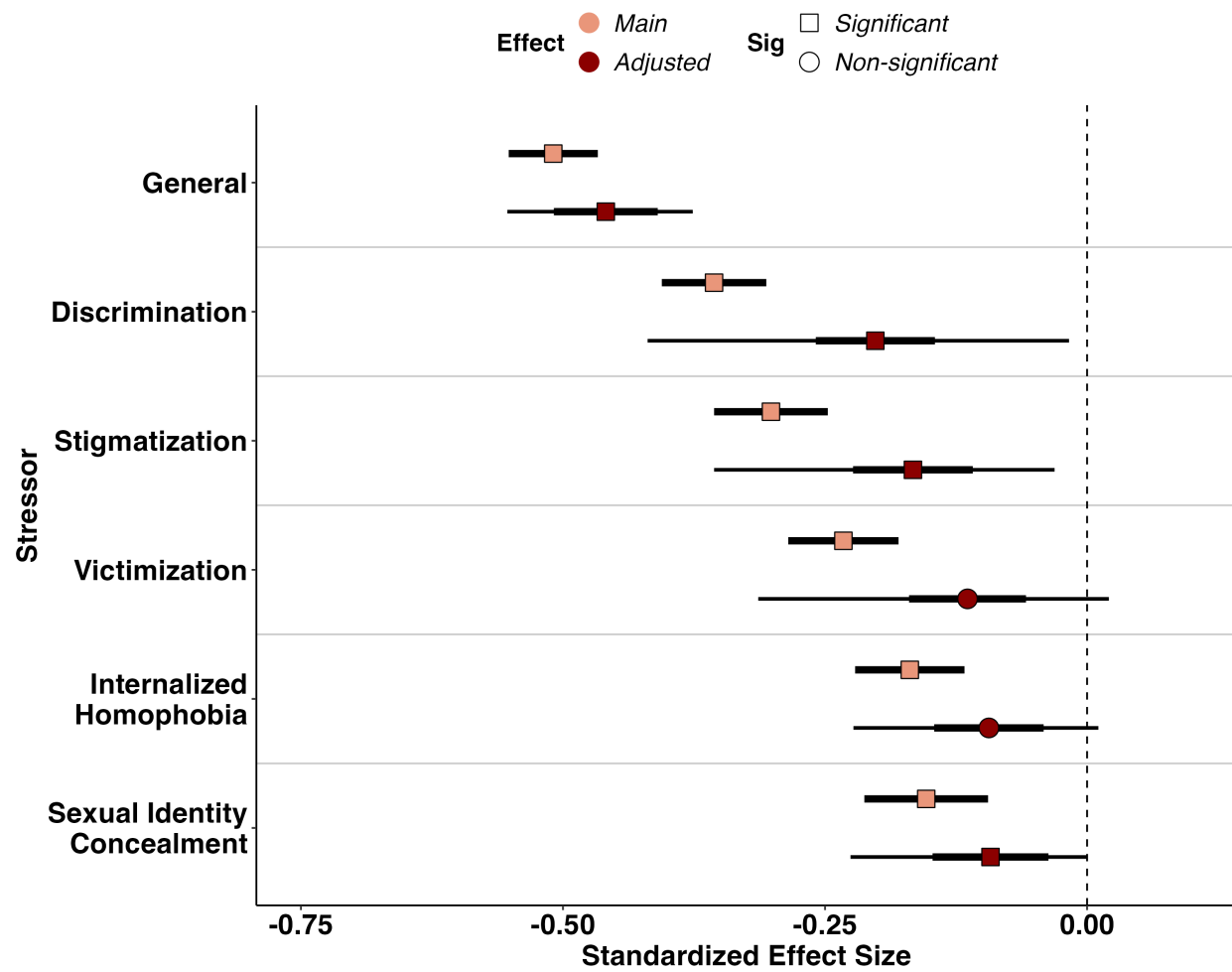


Figure 1-1. Standardized main and adjusted effect sizes of the associations between stressors and life satisfaction.

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community connectedness was also positive and significant ($b = .10$, 95% CI [.05, .15], $p < .001$), but became nonsignificant when adjusting for the other predictors ($b_{\text{avg}} = .07$, Range = .04 to .11, 95% CI_{Min&Max} [-.02, .16]). Contrary to my expectations, however, I found no evidence that greater perceived social support or LGBTQ+ community connectedness buffered against the effects of minority stress (see Table S1-6 and Figure S1-1).

Sexual Identity Centrality

Regarding sexual identity centrality, I found that sexual identity centrality was unrelated to life satisfaction (main effect: $b = -.02$, 95% CI [-.07, .04], $p = .521$; adjusted effect: $b_{\text{avg}} = -.01$, Range = -.07 to .02, 95% CI_{Min&Max} [-.13, .07]). Similar to the support variables, there were no moderation effects of sexual identity centrality for any of the stressors (see Table S1-6 and Figure S1-1).

Differential Impacts of Minority Stressors across Groups

Lastly, I examined whether different groups of sexual minority identities (age groups, sexual identities, and racial/ethnic groups) experienced differential associations between the stressors and life satisfaction. For these analyses, I reran specification curve models for each grouping variable separately. Table S1-7 and Figures S1-2 – S1-4 provide the standardized effect sizes of these associations for each group. While several differences emerged within groups for the main effects, no differences were found when accounting for all other stressors. Therefore, minority stressors were not differentially associated with life satisfaction across age, sexual identity, and racial/ethnic groups.

Discussion

Sexual minorities are theorized to report lower life satisfaction as a function of minority stress. Minority stress theory proposes that minority stressors should robustly predict lower life

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satisfaction, and that several factors across support and identity acceptance can influence the degree of these effects (I. H. Meyer, 2003). Yet, previous studies typically study only one minority stressor and one moderator, leaving questions about the robustness of these associations. In the present study, I 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 robustly and negatively associated with life satisfaction, 2) minority stressors generally explained meaningful variance in life satisfaction, 3) perceived social support, LGBTQ+ community connectedness, and sexual identity centrality did not moderate the effects of minority stress, and 4) there were no group differences in the associations between minority stressors and life satisfaction. However, given concerns with fits of various measurement and measurement invariance models, these findings should be interpreted with caution. I discuss these 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 (Fingerhut, 2018; I. H. 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 (I. H. Meyer, 2007). Among sexual minorities, greater amounts of minority stress are also theorized to explain individual differences in life satisfaction. Testing the robustness of different minority stressors together and with more general stress can be informative for policy by identifying the minority stressors that appear most important across people.

In this study, I used specification curve analysis to conduct a multiverse analysis to determine the robustness of the effects of different minority stressors while controlling for all

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viable combinations of minority stressors and general stress. While all five minority stressors alone were negatively associated with and generally 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 on stigmatization (Hatzenbuehler, 2016; Perales & Todd, 2018; Van Der Star et al., 2021) and contribute to the literature on discrimination (Barry et al., 2022; Cramer et al., 2017; Van Der Star et al., 2021) and sexual identity concealment (Anderson & Randlett, 1993; Bejakovich & Flett, 2018; De Miguel et al., 2018; Wong & Tang, 2003). Regarding sexual identity concealment, this finding 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, my findings could provide some initial evidence for these three minority stressors as important targets for policy changes. Given that these stressors were robust in this sample, policies that more strongly criminalize discrimination or increased funding for greater visibility and resources to LGBTQ+ centers may be ways for social systems to address these minority stressors. However, more research is needed in studying the stressors and their implications for policy.

Surprisingly, victimization and internalized homophobia were not robustly associated with life satisfaction. 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;

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Petrou & Lemke, 2018; Ummak et al., 2023). There may be 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 relationship of victimization and internalized homophobia with life satisfaction. Second, null findings may be reflective of floor effects. The 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. Furthermore, this could also reflect low rates of these stressors in the United States at the time of data collection (2016), where these stressors are experienced much less frequently for sexual minorities. Finally, and relatedly, 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 social safety processes to the experience of these minority stressors and continue to examine the associations of victimization and internalized homophobia with life satisfaction.

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

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Minority stress theory suggests that the effects of minority stress are mitigated by strong social support and feeling connected to the LGBTQ+ community (I. H. Meyer, 2003). How important one's sexual identity is to their self-concept may also influence these associations. I 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, who they receive support from may be what matters. For instance, one study found that support from sexual minority friends as opposed to support from family and heterosexual friends was more protective against the effects of minority stress (Doty et al., 2010). It may therefore be that the support from other sexual minorities who can relate to and provide relevant coping strategies to minority stress is most important to well-being. Such findings are why I anticipated greater feelings of connection to the LGBTQ+ community to buffer against minority stress. Yet, no such moderation effect emerged. The measure of LGBTQ+ community connectedness used in this study did not fully capture social support from other sexual minorities and instead reflected broader connection and identification with the LGBTQ+ community. Therefore, it may not be feeling connected to the community at large, but rather the amount of support felt from other sexual minorities. Future research should aim to tease apart the type of support different people can provide in studying the associations of minority stressors.

I also found no evidence that sexual identity centrality moderated how minority stressors were associated with life satisfaction. Previous research 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

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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 as phased by minority stressors, while others may be more sensitive to these stressors as they pose 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). Acting in accordance to how one feels on the inside instead of hiding their sexual minority identity 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. As more stress and less support afford fewer opportunities to be real (Hopwood et al., 2023), sexual minorities who remain true to themselves may experience less of the effects of minority stress. As such, future research should examine the moderating role of authenticity and realness.

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 could influence associations with minority stress because the integration of multiple identities into the self and others' reaction towards them can influence the types and frequency of minority stressors (I. H. Meyer, 2003). I explored whether different age groups (Younger, Middle, and Older adults), sexual identities (Gay/Lesbian, Bisexual, Other sexual identities including plurisexuals and asexuals), and races/ethnicities (Black, Latine, White) experienced differences in the associations between minority stressors and life satisfaction.

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However, I 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.

Yet, there may be multiple reasons behind these null findings. For starters, middle and older adults may differ in the processes linking minority stress to life satisfaction. As these adults experienced times of much less social support, some adults may have adapted to minority stressors while others were more sensitized. In this case, these effects would cancel each other out through aggregation. For different sexual identities and racial/ethnic groups, the measures used in this study may not have adequately tapped into their lived experiences. Bisexual and plurisexual individuals are stigmatized for their attraction to multiple genders and are questioned about the validity of their identity (Feinstein et al., 2023). Some of the measures, like internalized homophobia, may not have accurately captured the experiences of other sexual identities (e.g., internalized biphobia), and thus the differences in this type of stressor were not fully captured here. Additionally, Black and Latine sexual minorities experience minority stressors as a result of their racial/ethnic identity, sexual identity, or the intersection of the two (Cyrus, 2017; L. M. Roberts & Christens, 2021). 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 et al., 2019; Parmenter & Barrita, 2024). Relatedly, the meaning of several items may be different across groups per the general lack of achieving scalar invariance. 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

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minorities (Fredriksen-Goldsen et al., 2017; Hammack et al., 2018). Some of the 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 the experiences of various intersecting identities.

Limitations and Constraints on Generalizability

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

First, the 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 this study cannot answer questions about the temporal processes that link minority stress to life satisfaction. While I found evidence that some minority stressors were negatively associated with life satisfaction, I was unable to determine

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how these minority stressors were related to life satisfaction over time. Future research is needed that maps the role of time that minority stress theory proposes to well-being (Hopwood et al., 2022). 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). More research is needed with such designs to elucidate these processes.

Lastly, several of the measures used in this study either did not meet the criteria for good model fit or were unable to meet measurement invariance standards. As such, this may have impacted the findings and, therefore, warrants caution in how they are interpreted. There may also be other relevant minority stressors and moderators that I did not examine in this study that may also be important in these associations. 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 are also important in understanding 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 centrality, and differential group experiences, may further amplify or reduce the impacts of minority stressors. In this study, I found support for several minority stressors being negatively and robustly associated with life satisfaction that point to potential actionable targets for policy. Additionally, I found no evidence of any moderation effects across theoretical moderators, highlighting a need for research to further study and identify other potential moderators that may buffer or exacerbate the effects of minority stress. Overall, these findings highlight that while minority stressors are negatively associated with life satisfaction, there are

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

Supplemental Materials

Table S1-1*Measurement fit indices for continuous variables.*

Measure	DF	CFI	RMSEA
Life Satisfaction	5	.991	.079
Discrimination	25	.969	.082
Stigmatization	0	1.000	.000
Victimization	8	.986	.060
Internalized Homophobia	1	1.000	.000
Sexual Identity Concealment	2	.993	.080
General Stress	54	.566	.103
Perceived Social Support	50	.979	.069
LGBTQ+ Community Connectedness	7	.984	.081
Sexual Identity Centrality	4	.995	.054

Note. DF = Degrees of Freedom. CFI = Confirmatory Fit Index. RMSEA = Root Mean Square Error of Approximation. Values represent the final fit indices from confirmatory factor analysis models. Italicized values indicate fit indices that did not meet the criteria for good fit (CFI > .95, RMSEA < .08) even after introducing dependencies. I did not use standardized factor scores for general stress, given the poor overall fit of the model, and instead used the raw sum scores in all specification curve models. I elected to accept the fit for discrimination and LGBTQ+ community connectedness because of 1) how close RMSEA values were to the cutoff and 2) not wanting to oversaturate the model with dependencies.

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Table S1-2

Measurement invariance models across age groups.

Variable	Measurement Model	CFI	ΔCFI	RMSEA	ΔRMSEA
Life Satisfaction	Configural	.988		.094	
	Metric	.984	-.004	.087	-.007
	Scalar	.977	-.006	.089	.002
Discrimination	Configural	.967		.082	
	Metric	.962	-.005	.080	-.002
	Scalar ♦	.956	-.006	.080	.000
Stigmatization	Configural	1.000		.000	
	Metric ♦	1.000	.000	.000	.000
	Scalar	.999	-.001	.053	.053
Victimization	Configural	.985		.061	
	Metric	.978	-.006	.061	.000
	Scalar ♦	.974	-.004	.061	-.001
Internalized Homophobia	Configural	1.00		.000	
	Metric	.999	-.001	.025	.025
	Scalar	.998	-.001	.029	.004
Sexual Identity Concealment	Configural	.996		.058	
	Metric	.990	.074	.074	.016
	Scalar	.959	.129	.129	.054

Note. CFI = Confirmatory Fit Index. RMSEA = Root Mean Square Error of Approximation. ♦ Indicates partial invariance for that model was achieved. Grayed models indicate the measurement invariance achieved for each measure.

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Table S1-3

Measurement invariance models across sexual identities.

Variable	Measurement Model	CFI	ΔCFI	RMSEA	ΔRMSEA
Life Satisfaction	Configural	.983		.110	
	Metric	.984	.001	.091	-.019
	Scalar	.982	-.001	.081	-.010
Discrimination	Configural	.966		.084	
	Metric	.966	.000	.077	-.007
	Scalar	.960	-.006	.077	.000
Stigmatization	Configural	1.000		.000	
	Metric ♦	1.000	.000	.000	.000
	Scalar	1.000	.000	.015	.015
Victimization	Configural	.987		.057	
	Metric	.986	-.002	.051	-.006
	Scalar	.976	-.009	.057	.006
Internalized Homophobia	Configural	1.000		.000	
	Metric	.999	-.001	.025	.025
	Scalar	.991	-.008	.055	.029
Sexual Identity Concealment	Configural	.992		.073	
	Metric ♦	.983	-.009	.082	.009
	Scalar	.939	-.044	.050	.050

Note. CFI = Confirmatory Fit Index. RMSEA = Root Mean Square Error of Approximation. ♦ Indicates partial invariance for that model was achieved. Grayed models indicate the measurement invariance achieved for each measure.

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Table S1-4

Measurement invariance models across racial/ethnic identities.

Variable	Measurement Model	CFI	ΔCFI	RMSEA	ΔRMSEA
Life Satisfaction	Configural	.988		.091	
	Metric	.988	.000	.074	-.017
	Scalar	.989	.001	.061	-.012
Discrimination	Configural	.965		.086	
	Metric	.958	-.006	.084	-.001
	Scalar	.949	-.009	.086	.002
Stigmatization	Configural	1.000		.000	
	Metric	1.000	.000	.000	.000
	Scalar	1.000	.000	.000	.000
Victimization	Configural	.984		.064	
	Metric	.984	.000	.054	-.010
	Scalar♦	.977	-.007	.058	.004
Internalized Homophobia	Configural	1.000		.000	
	Metric	1.000	.000	.000	.000
	Scalar	.996	-.004	.029	.029
Sexual Identity Concealment	Configural	.993		.081	
	Metric	.994	.001	.054	-.028
	Scalar	.993	-.001	.046	-.007

Note. CFI = Confirmatory Fit Index. RMSEA = Root Mean Square Error of Approximation. ♦ Indicates partial invariance for that model was achieved. Grayed models indicate the measurement invariance achieved for each measure.

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Table S1-5

Standardized main and adjusted effect sizes of minority stressors on life satisfaction.

Stressor	Main Effect [95% CI]	<i>p</i>	<i>R</i> ²	Average Adjusted Effect Size [95% CI Min and Max]	Range of Effect Sizes
Discrimination	-.36*** [-.41, -.31]	<.001	.12	-.20 [-.42, -.02]	-.36 to -.08
Stigmatization	-.30*** [-.36, -.25]	<.001	.07	-.17 [-.36, -.03]	-.30 to -.09
Victimization	-.23*** [-.29, -.18]	<.001	.05	-.11 [-.31, .01]	-.25 to -.03
Internalized Homophobia	-.17*** [-.22, -.12]	<.001	.03	-.09 [-.22, .01]	-.17 to -.04
Sexual Identity Concealment	-.15*** [-.21, -.09]	<.001	.02	-.09 [-.23, -.00]	-.17 to -.05
General	-.51*** [-.55, -.47]	<.001	.28	-.46 [-.55, -.38]	-.51 to -.43

Note. ****p* < .001. CI = Confidence intervals. Bolded values with grayed boxes indicate significant effects. Brackets represent 95% confidence intervals from the lowest minimum and maximum confidence interval values from across all relevant models.

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Table S1-6

Standardized effect sizes of moderator interaction terms.

Stressor	Perceived Social Support				LGBTQ+ Community Connectedness				Sexual Identity Centrality			
	Main	<i>p</i>	Adjusted	Range	Main	<i>p</i>	Adjusted	Range	Main	<i>p</i>	Adjusted	Range
Discrimination	.004 [-.035, .043]	.849	-.001 [-.055, .053]	-.014 to .014	-.017 [-.066, .033]	.507	.002 [-.077, .068]	-.021 to .022	-.040 [-.093, .012]	.132	-.025 [-.108, .045]	-.05 to -.009
Stigmatization	.030 [-.015, .075]	.186	.026 [-.039, .087]	.008 to .043	.030 [-.026, .085]	.291	.046 [-.046, .111]	.017 to .060	-.008 [-.066, .049]	.779	.010 [-.095, .088]	-.030 to .032
Victimization	.001 [-.043, .044]	.965	-.008 [-.050, .063]	-.039 to .015	.055 [-.002, .112]	.059	.065 [-.009, .136]	.055 to .073	.005 [-.052, .063]	.853	.027 [-.071, .117]	-.013 to .059
Internalized Homophobia	-.027 [-.068, .015]	.212	-.016 [-.078, .036]	-.035 to -.002	.014 [-.038, .065]	.607	.034 [-.061, .111]	-.001 to .063	-.010 [-.063, .044]	.723	.004 [-.087, .085]	-.028 to .027
Sexual Identity Concealment	-.030 [-.079, .020]	.241	-.020 [-.080, .041]	-.030 to -.008	-.010 [-.073, .053]	.759	-.001 [-.078, .063]	-.017 to .009	.029 [-.037, .096]	.385	.049 [-.037, .121]	.029 to .064
General	-.021 [-.055, .014]	.236	-.018 [-.059, .024]	-.024 to -.013	.026 [-.020, .073]	.267	.032 [-.027, .090]	.024 to .040	.026 [-.020, .073]	.269	.036 [-.021, .097]	.026 to .046

Note. Brackets represent 95% confidence intervals. Range reflects the range of effect sizes for those stressors across all relevant models.

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Table S1-7

Standardized effect sizes of minority stressors across age, sexual identity, and racial/ethnic groups.

Stressors	Main Effect						Adjusted Effect					
	b	p	b	p	b	p	b	Range	b	Range	b	Range
Age	Young		Middle		Older		Young		Middle		Older	
Discrimination	-.23 [-.28, -.17]	<.001	-.37 [-.46, -.29]	<.001	-.30 [-.39, -.21]	<.001	-.14 [-.23, -.06]	-.30 to .02	-.25 [-.46, -.06]	-.37 to -.15	-.13 [-.43, .13]	-.33 to .03
Stigmatization	-.24 [-.31, -.17]	<.001	-.33 [-.44, -.22]	<.001	-.32 [-.42, -.23]	<.001	-.12 [-.32, .04]	-.24 to -.05	-.14 [-.44, .08]	-.33 to -.04	-.23 [-.44, -.07]	-.32 to -.17
Victimization	-.20 [-.27, -.13]	<.001	-.26 [-.37, -.16]	<.001	-.26 [-.36, -.17]	<.001	-.09 [-.31, .08]	-.23 to .001	-.08 [-.37, .14]	-.26 to .03	-.18 [-.41, -.01]	-.31 to -.10
Internalized Homophobia	-.10 [-.17, -.04]	.002	-.21 [-.31, -.11]	<.001	-.17 [-.27, -.07]	<.001	-.06 [-.17, -.01]	-.11 to -.03	-.10 [-.31, .08]	-.22 to -.02	-.10 [-.27, .05]	-.27 to .05
Sexual Identity Concealment	-.09 [-.16, -.01]	.021	-.14 [-.24, -.04]	.007	-.12 [-.22, -.02]	.024	-.06 [-.16, .03]	-.08 to -.04	-.11 [-.26, .01]	-.16 to -.07	-.04 [-.22, .11]	-.12 to .02
General	-.42 [-.47, -.36]	<.001	-.55 [-.64, -.47]	<.001	-.58 [-.67, -.49]	<.001	-.39 [-.49, -.30]	-.42 to -.36	-.46 [-.64, -.30]	-.55 to -.41	-.53 [-.68, -.39]	-.59 to -.49
Sexual Identity	Gay/Lesbian		Bisexual		Other		Gay/Lesbian		Bisexual		Other	
Discrimination	-.36 [-.43, -.30]	<.001	-.27 [-.35, -.19]	<.001	-.34 [-.48, -.21]	<.001	-.19 [-.54, .17]	-.41 to .04	-.13 [-.46, .22]	-.28 to -.01	-.20 [-.50, .14]	-.34 to -.05
Stigmatization	-.35 [-.42, -.28]	<.001	-.20 [-.29, -.11]	<.001	-.28 [-.41, -.14]	<.001	-.24 [-.52, -.03]	-.38, -.11	-.11 [-.47, .23]	-.27 to -.02	-.21 [-.50, .01]	-.30 to -.14
Victimization	-.21 [-.28, -.14]	<.001	-.19 [-.27, -.12]	<.001	-.22 [-.34, -.09]	<.001	-.15 [-.45, .03]	-.33 to -.04	-.12 [-.45, .17]	-.28 to -.04	-.12 [-.40, .13]	-.23 to -.02

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Internalized Homophobia	-0.17 [-.29, -.06]	.003	-.19 [-.39, .01]	.068	-.29 [-.50, -.09]	.005	-.07 [-.29, .11]	-.17 to .001	-.14 [-.49, .16]	-.25 to -.06	-.23 [-.51, .02]	-.31 to -.18
Sexual Identity Concealment	-0.15 [-.23, -.06]	<.001	-.01 [-.09, .07]	.742	-.12 [-.24, -.01]	.035	-.06 [-.25, .17]	-.17 to .04	-.01 [-.16, .23]	-.06 to .07	-.04 [-.26, .21]	-.15 to .06
General	-0.54 [-.60, -.48]	<.001	-.45 [-.52, -.37]	<.001	-.48 [-.60, -.36]	<.001	-.53 [-.73, -.39]	-.62 to -.46	-.44 [-.67, -.19]	-.51 to -.39	-.40 [-.61, -.15]	-.48 to -.33
Race/Ethnicity	Black		Latine		White		Black		Latine		White	
Discrimination	-.25 [-.36, -.14]	<.001	-.24 [-.34, -.14]	<.001	-.37 [-.43, -.31]	<.001	-.08 [-.37, .37]	-.25 to .14	-.20 [-.72, .27]	-.42 to -.02	-.16 [-.46, .18]	-.37 to .03
Stigmatization	-.35 [-.49, -.21]	<.001	-.32 [-.45, -.18]	<.001	-.28 [-.35, -.22]	<.001	-.23 [-.52, .07]	-.35 to -.12	-.21 [-.71, .29]	-.37 to -.10	-.20 [-.46, .01]	-.33 to -.07
Victimization	-.15 [-.29, -.01]	.037	-.07 [-.17, .03]	.168	-.30 [-.37, -.24]	<.001	-.05 [-.48, .27]	-.21 to .10	.01 [-.36, .41]	-.16 to .15	-.18 [-.40, -.01]	-.30 to -.10
Internalized Homophobia	-.14 [-.29, .02]	.080	.01 [-.22, .23]	.951	-.21 [-.32, -.10]	<.001	-.14 [-.35, .08]	-.16 to -.11	.09 [-.22, .44]	.01 to .18	-.11 [-.32, .07]	-.21 to -.03
Sexual Identity Concealment	-.11 [-.25, .04]	.148	-.10 [-.23, .02]	.107	-.17 [-.25, -.10]	<.001	-.07 [-.36, .20]	-.14 to -.02	-.14 [-.56, .13]	-.27 to -.03	-.10 [-.29, .12]	-.18 to -.004
General	-.38 [-.49, -.27]	<.001	-.43 [-.52, -.35]	<.001	-.55 [-.60, -.49]	<.001	-.33 [-.54, -.08]	-.40 to -.27	-.39 [-.68, .03]	-.45 to -.26	-.52 [-.71, -.38]	-.60 to -.46

Note. Brackets represent 95% confidence intervals. Bolded values indicate significant effect sizes. Grayed boxes indicate significant group differences in associations between those groups. Range reflects the range of effect sizes for those stressors across all relevant models.

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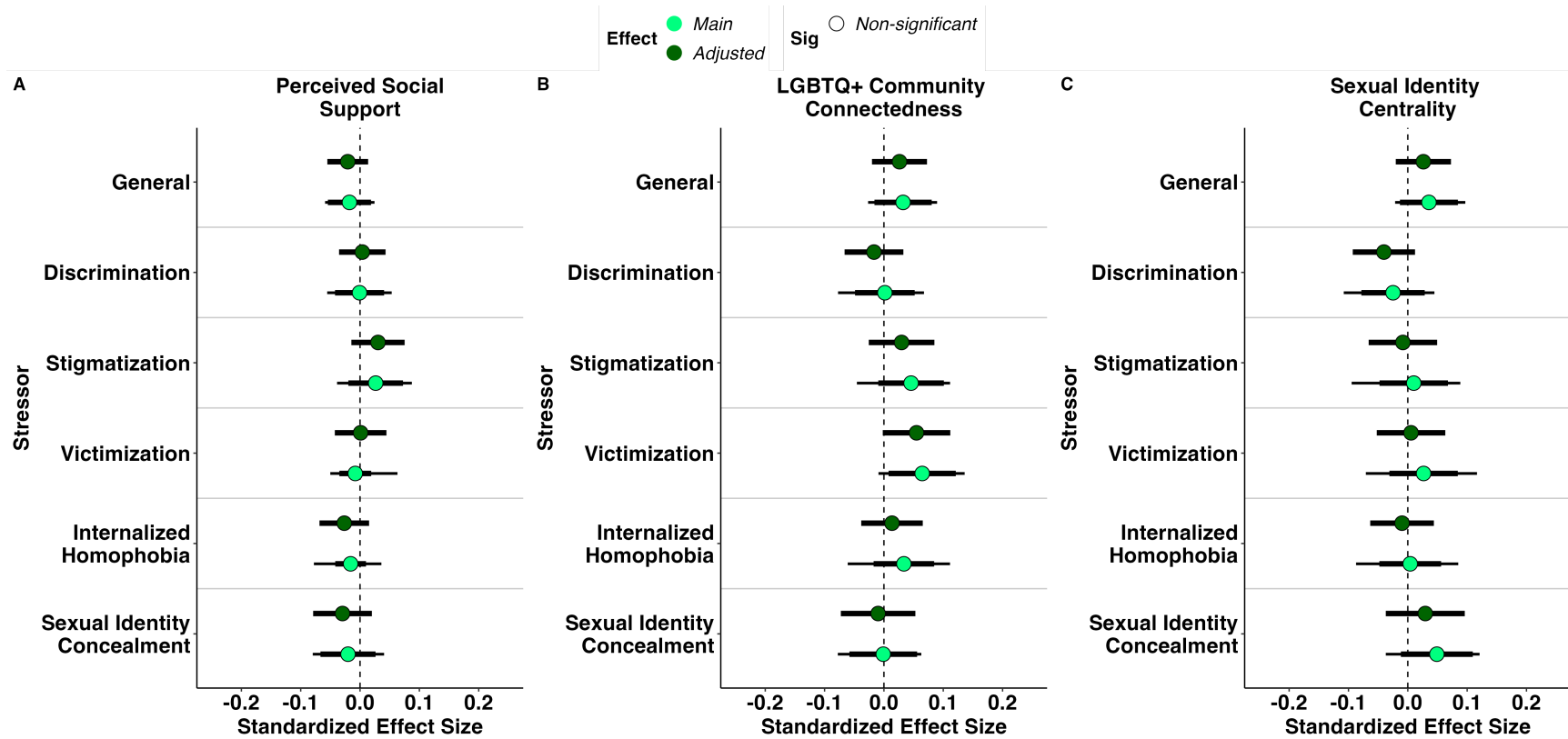


Figure S1-1. Standardized effect sizes of moderators on the influence of stressors on life satisfaction.

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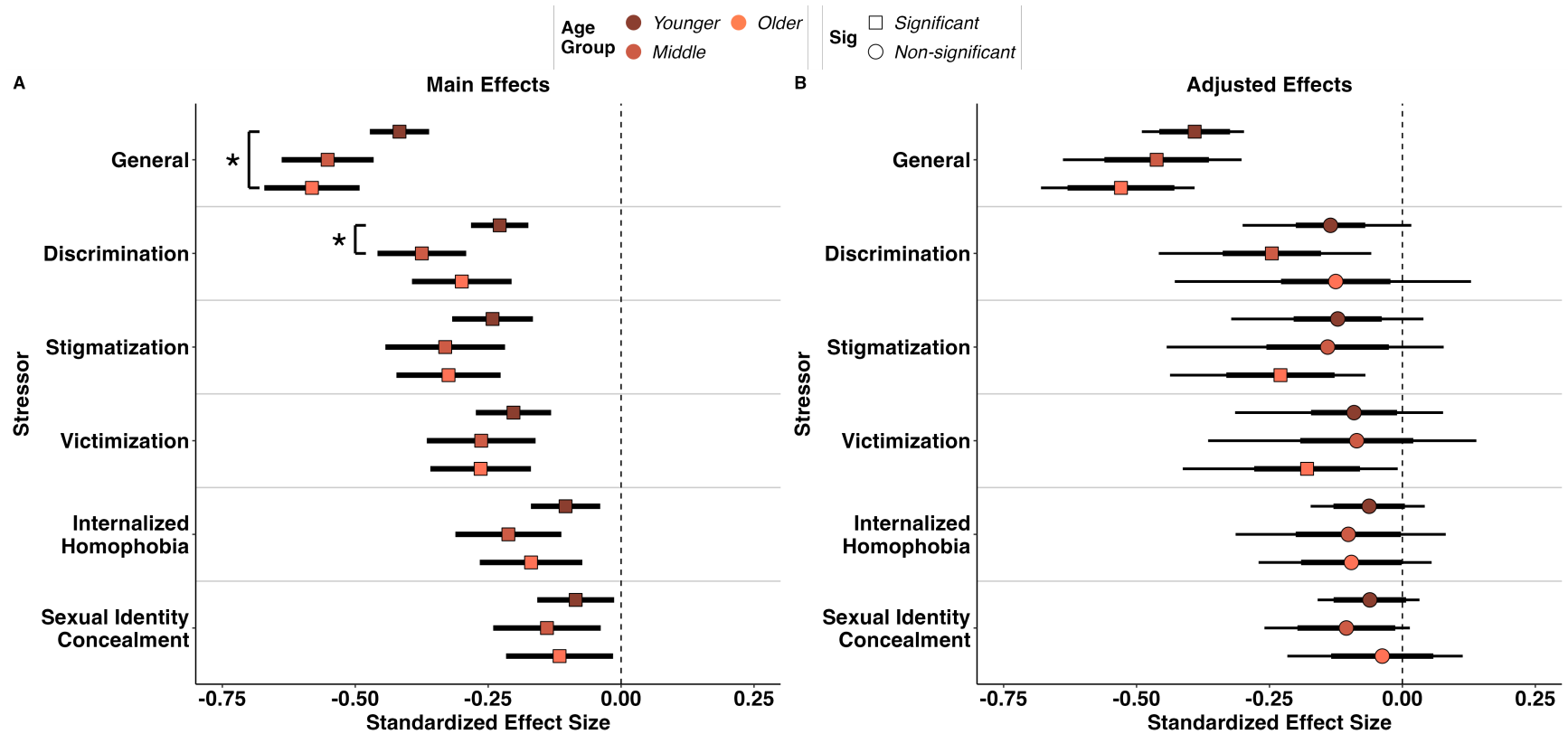


Figure S1-2. Standardized effect sizes of stressors on life satisfaction across age groups. * indicates significant differences in the associations between those groups.

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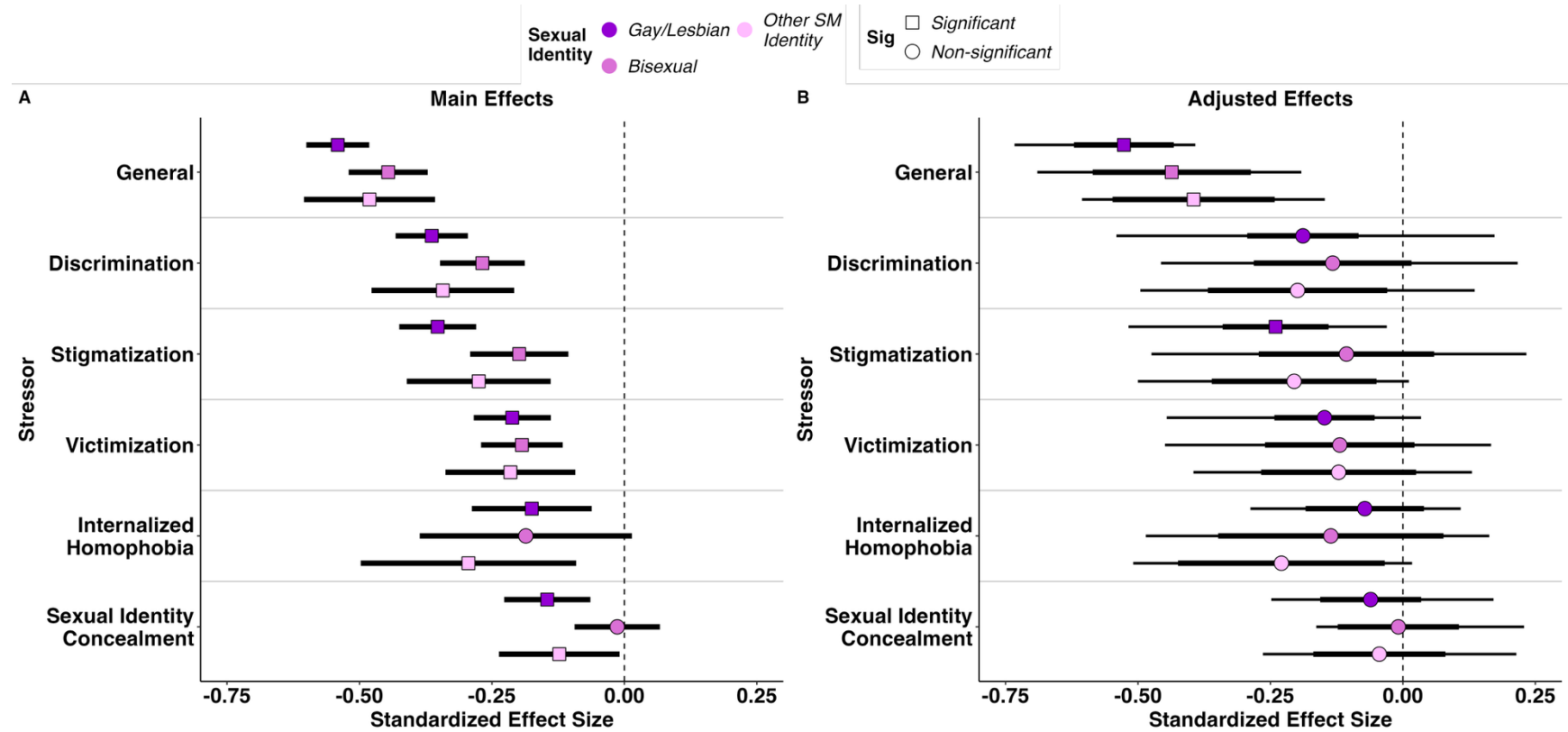


Figure S1-3. Standardized effect sizes of stressors on life satisfaction across sexual identity groups. * indicates significant differences in the associations between those groups.

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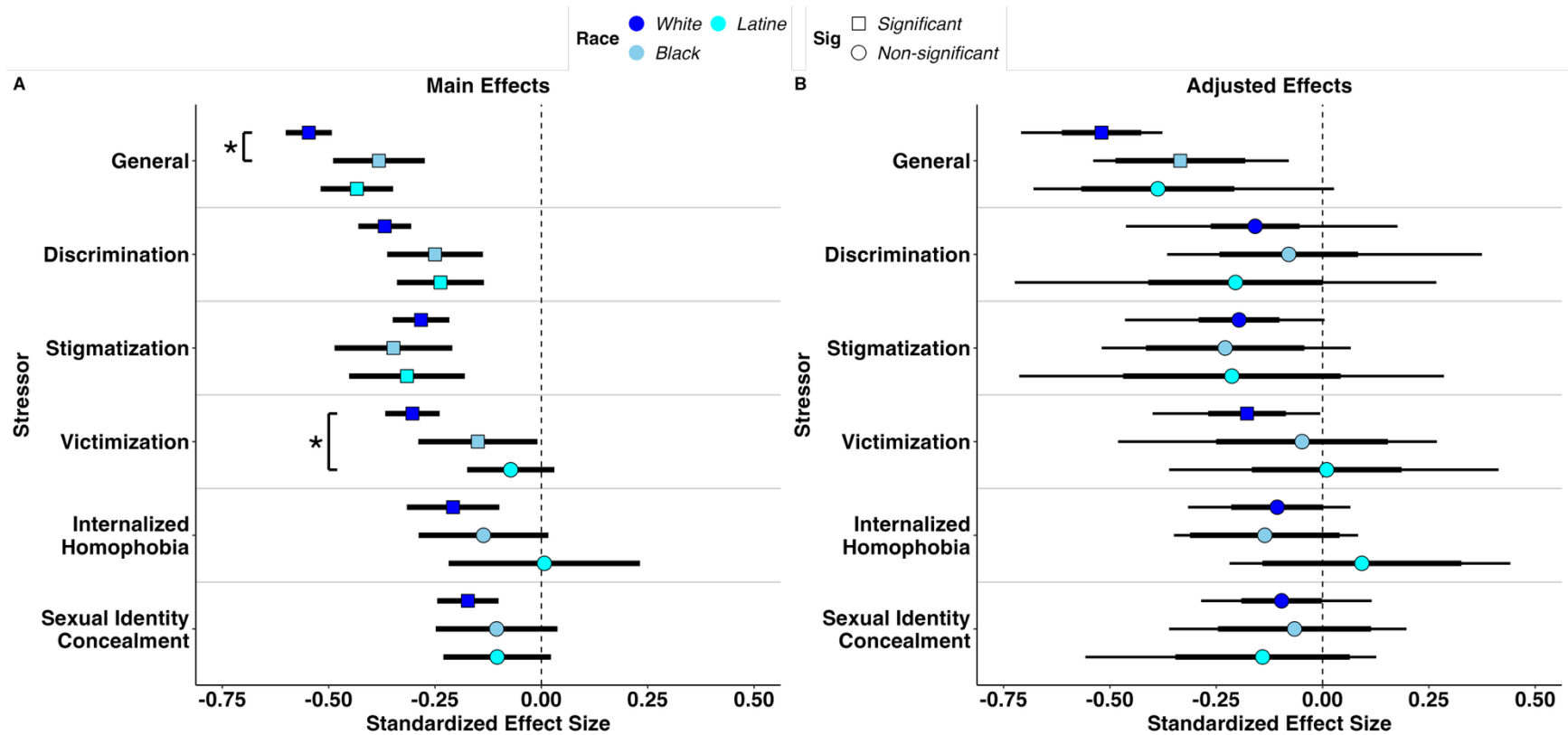


Figure S1-4. Standardized effect sizes of stressors on life satisfaction across racial/ethnic groups. * indicates significant differences in the associations between those groups.

Chapter 2

The effect of marriage equality on sexual minority life satisfaction

Abstract

Over the last decade, increasing rates of coming out signal a trend of social acceptance for sexual minorities, which tracks with increased visibility and removal of structural barriers. According to minority stress and social safety theory, policy changes like the implementation of marriage equality serve as a reduction in structural barriers that should translate to reducing disparities in well-being for sexual minorities. However, the literature on the effects of marriage equality on sexual minority well-being is muddy because studies: 1) do not make comparisons between sexual minorities and heterosexuals, 2) typically examine short-term changes as opposed to the lasting benefits many years later, and 3) do not capture within-person changes that help contextualize who may (not) benefit from such policy changes. The current study addresses these shortcomings of the previous literature to approximate the causal effects of marriage equality using longitudinal panel data from Australia and the UK using a natural experiment design. While between-group level differences in life satisfaction persisted, marriage equality enactment eliminated pre-enactment slope differences, highlighting that this policy change prevented further disparities in well-being over time. There were also indications of anticipation effects in the Australian sample, such that the effects of marriage equality occurred when citizens knew about its passing before it was signed into law. Finally, there were substantial individual differences surrounding levels and slopes. Although age, gender, and marital status were not associated with marriage equality effects, this suggests that understanding the effects of marriage equality is much more complex.

Introduction

Current estimates suggest that about 9% of the global population identifies as a sexual minority (i.e. someone who does not identify as heterosexual or straight) (Jackson, 2023). Rising rates in sexual minority identification over the last decade track with increased signals of acceptance of the LGBTQ+ community through increased visibility (Hammack et al., 2018; Jackson, 2023; Williams Institute, 2021) and legislation aimed at promoting equality (Human Rights Campaign., n.d.), which may suggest that more people are comfortable being open about their sexual orientation (i.e. being out). Despite the progress, sexual minorities across the globe continue to report lower levels of well-being (Bartram, 2023; Bränström et al., 2022; De Miguel et al., 2018; D. Meyer et al., 2023; Perales, 2016; Thomeer & Reczek, 2016; Tolmacz et al., 2023). Disparities in well-being are thought to persist because of continued discrimination, victimization, and (internalized) homophobia (Frost & Meyer, 2023). Some countries still criminalize homosexuality, where punishment can range from fines, imprisonment, and, in extreme cases, death sentences (Gerber, 2020). Moreover, more progressive countries are seeing rises in legislation aimed at reversing much of the progress in sexual minority rights (e.g., increases in discriminatory legislation, anti-LGBTQ+ lawmakers appointed to high-ranking judicial positions) (Schlehofer et al., 2023). These identity-based stressors (coined minority stressors) are thought to explain why sexual minorities report lower levels of well-being compared to heterosexuals (I. H. Meyer, 2003).

According to minority stress theory (I. H. Meyer, 2003, 2007; Parmenter & Barrita, 2024), minority stressors act as additional sources of stress that explain these between-group differences in well-being. Indeed, empirical research highlights that sexual minorities often report lower levels of well-being than heterosexuals as a function of minority stress (Bartram,

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2023; Bejakovich & Flett, 2018; D. Meyer et al., 2023; Tolmacz et al., 2023; Ummak et al., 2023; Yan et al., 2023). Both minority stress theory (Frost & Meyer, 2023; I. H. Meyer, 2003) and social safety theory (Diamond & Alley, 2022) suggest that reductions in minority stress that signal social acceptance may be potent factors that can foster greater well-being for sexual minorities. Much of the extant research on minority stress primarily examined individual-level predictors such as internalized homophobia, identity concealment, and interpersonal experiences and stressors. However, examinations of structural changes hold great promise for positively impacting sexual minority well-being at scale for two reasons. First, structural changes that favor sexual minorities can reflect social acceptance (Hatzenbuehler, 2016) by signaling that the interests of sexual minorities are of concern to the general public. Second, the heavy emphasis on individual-level factors in the literature inadvertently puts the onus on sexual minorities to improve their well-being and frames these groups as in need of intervention (Antonoplis, 2024; I. H. Meyer, 2015; Weststrate et al., 2024). In contrast, a social justice framework identifies structural changes that can promote sexual minority well-being, which instead puts the onus on society and officials to target social policy changes that can improve sexual minority well-being, rather than on the individuals themselves. In sum, structural changes provide a clear and equitable pathway to addressing sexual minority well-being disparities.

However, whether widespread, policy-level adoption actually improves sexual minority well-being hinges on evidence that such large-scale structural changes do impact sexual minority well-being. One promising avenue for elucidating the role of structural changes is using archival data to capture how the well-being of sexual minorities unfolds before and after the removal of structural barriers or the implementation of legal protections. In other words, examining sexual minority well-being changes that coincide with immediate changes in structural stigma (e.g.,

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enactment of laws promoting equity) could help further our understanding of addressing well-being disparities. Structural stigma refers to discriminatory legislation and criminal punishment for being a sexual minority, as well as the absence of protections for civil liberties (Hatzenbuehler, 2016). Current evidence suggests that while sexual minorities who live in areas with higher levels of structural stigma report lower levels of well-being (Hatzenbuehler, 2009, 2016; Pachankis & Bränström, 2018; Van Der Star et al., 2021), reductions in structural stigma are found to result in lasting improvements to sexual minority well-being (Bränström & Pachankis, 2023; Hatzenbuehler, 2016; Hatzenbuehler et al., 2018). One prominent example of structural stigma is (the lack of) marriage equality legislation. Marriage equality legislation refers to the legal recognition of same-sex marriage, granting legal spousal rights to same-sex partners, such as property rights, resources, and tax benefits, that they otherwise would be unable to receive without explicit marriage equality laws (Willettts, 2011). Marriage equality also signals societal acceptance of sexual minorities (Williams Institute, 2021; Ogolsky et al., 2019). While more countries are enacting marriage equality legislation, many countries still do not allow same-sex couples to get married (Human Rights Campaign., n.d.). Unfortunately, marriage equality legislation remains controversial in many countries with these protections, making its future uncertain when new political administrations that oppose such laws take office. Marriage equality enactment is therefore a prime candidate to examine in understanding the effects of structural stigma on sexual minority well-being. Furthermore, mapping marriage equality legislation with natural experiment designs before and after legislation implementation addresses several limitations of previous research on marriage equality, which I discuss next (see Figure 2-1).

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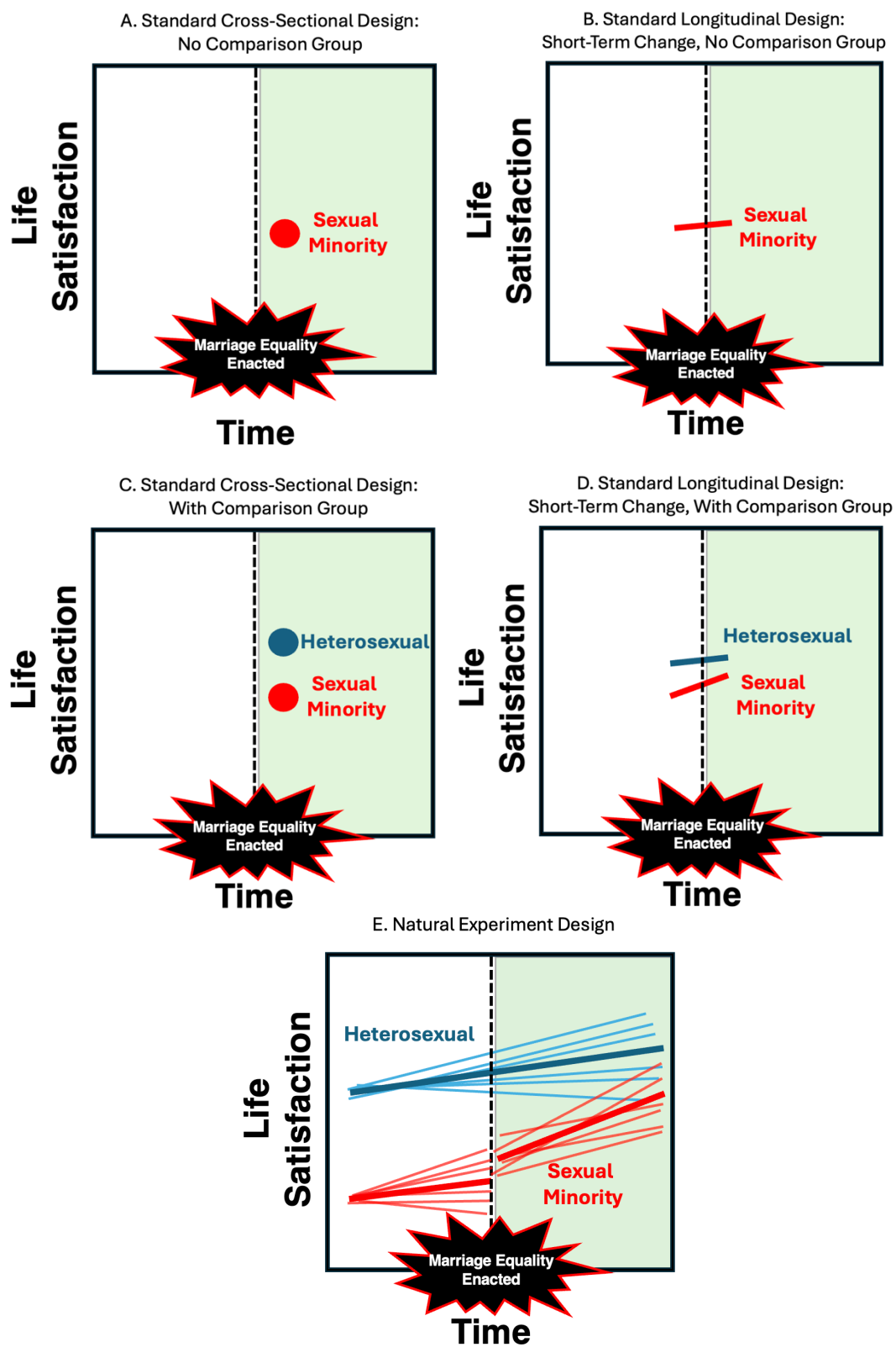


Figure 2-1. Types of study designs examining the effects of marriage equality. A) Some studies only examine the well-being of sexual minorities at one time point following marriage equality,

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making it uncertain whether changes are attributable to marriage equality implementation. B) Some longitudinal studies only examine changes in sexual minority well-being in the short-term, leaving gaps in whether resulting patterns are attributable to marriage equality or general lifespan well-being changes and whether these effects last over longer periods. C) Cross-sectional studies that use comparison groups help determine whether there are differences in well-being between sexual minorities and heterosexuals, but it remains unclear whether these level differences are attributable to marriage equality or not. D) Short-term longitudinal designs comparing sexual minorities and heterosexuals can help determine whether marriage equality results in differential patterns of well-being changes for sexual minorities. However, when only done in the short term, it is unclear with these effects persist into the long term and it can be hard to identify any immediate level shifts following policy enactment. Furthermore, these types of studies tend not to account for individual differences that address for whom marriage equality is impactful and in what ways. E) Natural experiment designs can address the limitations of the designs in A-D by comparing heterosexuals and sexual minorities over many waves that account for individual differences for each estimated level and slope.

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Previous research linking marriage equality legislation to sexual minority well-being, however, is mixed (Ogolsky et al., 2019; Huang & Liang, 2022; Kennedy & Dalla, 2020; Perales & Todd, 2018). As Figure 2-1 depicts, discrepancies in previous findings may result from several limitations across studies (e.g., temporal, cohort, and specificity gaps) that muddy the clarity of the overall effects of marriage equality legislation on sexual minority well-being. Natural experiment designs address these several gaps of the previous literature, making it the strongest test of the effects of marriage equality on sexual minority well-being for at least three reasons (Grosz et al., 2024).

First, there is a temporal gap: The temporal ordering of these effects remains unclear. Most studies examined the effects of marriage equality cross-sectionally or in the short term. Cross-sectional approaches cannot disentangle whether well-being differences were the same before and after marriage equality enactment (i.e. reverse causality) because they examine differences at a single time point, typically immediately following enactment (Figure 2-1A). It is therefore unclear in these designs what levels were like pre-enactment and whether any level changes in well-being occurred post-enactment. Longitudinal studies can correct this by following people across multiple years to capture well-being changes pre- and post-implementation. However, as noted in Figure 2-1B, some studies only examine this in the short term, making it unclear whether well-being returns to baseline levels as is theorized by setpoint well-being theories (Diener et al., 2006). These short-term longitudinal studies are therefore unable to answer whether the effects of marriage equality are short-lived or persist over many years. Additionally, longitudinal studies with few waves are unable to capture any immediate level changes in well-being following enactment. This is because multiple waves of data are needed to estimate the levels and consequent piecewise well-being slopes before and after

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marriage equality (e.g., Grosz et al., 2024; Schwaba et al., 2021). As such, research needs longitudinal designs with multiple assessments pre- and post-marriage equality to understand whether 1) there are significant differences in well-being before and after marriage equality and 2) there are long-term implications for well-being. Natural experiments that use multiple waves (three or more) before and after the event provide a strong test of whether effects of event-related changes persist or return to pre-event levels for the group thought to be affected by the event (see Schwaba et al., 2021 for an example).

Second, there is a cohort gap: To attribute well-being changes to marriage equality enactment, research needs to determine whether changes only exist for sexual minorities. Minority stress theory (Frost & Meyer, 2023; I. H. Meyer, 2003) suggests that structural changes should *only* impact the minority group as it applies to their marginalized sexual identity. A reference group comparison to people who should be unaffected by marriage equality legislation (straight individuals) rules out competing explanations of well-being changes (Leatherdale, 2019; Sekhon & Titunik, 2012). With cross-sectional designs (Figure 2-1C), reference group comparisons can help examine whether well-being discrepancies exist prior to enactment. Yet, as noted above, cross-sectional designs cannot discern whether emergent between-group patterns are the cause of marriage equality enactment or reflect other policy changes (e.g., Brexit in the UK). Using comparison groups in longitudinal studies addresses concerns that any resulting well-being changes are from marriage equality and not other population-level explanations, such as age-graded changes. As noted in Figure 2-1D, since most longitudinal studies are in the short term, it leaves open questions as to whether reductions in between-group differences following marriage equality revert to their larger, pre-enactment sizes or if they continue to get smaller. Furthermore, natural experiments that use comparison groups to rule out such factors allow

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researchers to approximate the causal effects of marriage equality legislation (Grosz et al., 2024). Using a reference group theorized to experience no change (e.g., marriage equality should not influence well-being changes for heterosexuals), therefore, provides a powerful test of minority stress theory. Overall, to fully capture the effects of marriage equality, sexual minorities must be compared to heterosexuals before and after policy enactment.

Lastly, there is a specificity gap: Not all studies accounted for individual differences in the response to marriage equality. Not accounting for individual differences assumes that all sexual minorities report similar changes in well-being, when previous research showed that there are individual differences in how sexual minorities are impacted by minority stress (Kranz & Pierrard, 2018; Parmenter & Barrita, 2024; Perales & Todd, 2018; E. R. Roberts et al., 2024; Conlin et al., 2019). Findings of the global impact of marriage equality enactment on sexual minority well-being do provide strong evidence for the potent role of structural changes (Hatzenbuehler, 2016; Huang & Liang, 2022; Ogolsky et al., 2019; Pachankis & Bränström, 2018). Yet, the global effect is an aggregate across the entire sexual minority sample and does not account for individual experiences (Bränström et al., 2022; Van Der Star et al., 2021; Bränström & Pachankis, 2023; Kennedy & Dalla, 2020; Perales & Todd, 2018). In other words, some people may experience substantially more increases in well-being, while others experience no change or even experience steep declines following implementation. Accounting for individual differences allows researchers and policy makers to better understand *who* benefits from marriage equality legislation and insights as to further address disparities for people who may be adversely affected by its implementation (e.g., someone who lives in a predominantly homophobic region of the country). Additionally, effects may be seen even before marriage equality is signed into law when citizens know that the law has passed. From a social justice

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standpoint, being able to determine why some sexual minorities report declines or no change in well-being could help pinpoint additional areas of structural change that ensure disparities are addressed. As noted in Figure 2-1E, natural experiment designs allow the incorporation of individual difference variables into their designs that may further explain why some people report differences from the global effect of the event, allowing researchers to contextualize for whom those experiences are most potent or detrimental.

Overall, natural experimental designs with 1) more than three waves pre- and post-marriage equality enactment that 2) compare heterosexuals and sexual minorities and 3) capture within-person changes are needed to better estimate the effects of marriage equality enactment on levels and changes in well-being. The present study aims to examine how decreases in structural stigma (as operationalized by the enactment of marriage equality legislation) impacted life satisfaction levels and trajectories using a natural experiment design. To do this, I used data from two longitudinal panel studies from Australia (Household, Income and Labour Dynamics in Australia; HILDA) and the United Kingdom (UK Household Longitudinal Study; UKHLS) that followed many individuals over two decades. I compared levels and trajectories of life satisfaction—an indicator of well-being (Diener, 1984)—between sexual minorities and heterosexuals to capture the effects of marriage equality on sexual minority well-being. I further contextualized the effects of marriage equality by seeing whether different people (e.g., age, gender, and marital status) may be differentially impacted, whether marriage equality effects lasted in the long-term, and if any anticipation effects occurred in the year prior to policy being signed into law (see Figure 2-2 for an overview of all addressed research questions). Overall, this study provides a strong and comprehensive examination of how marriage equality affects sexual minority well-being.

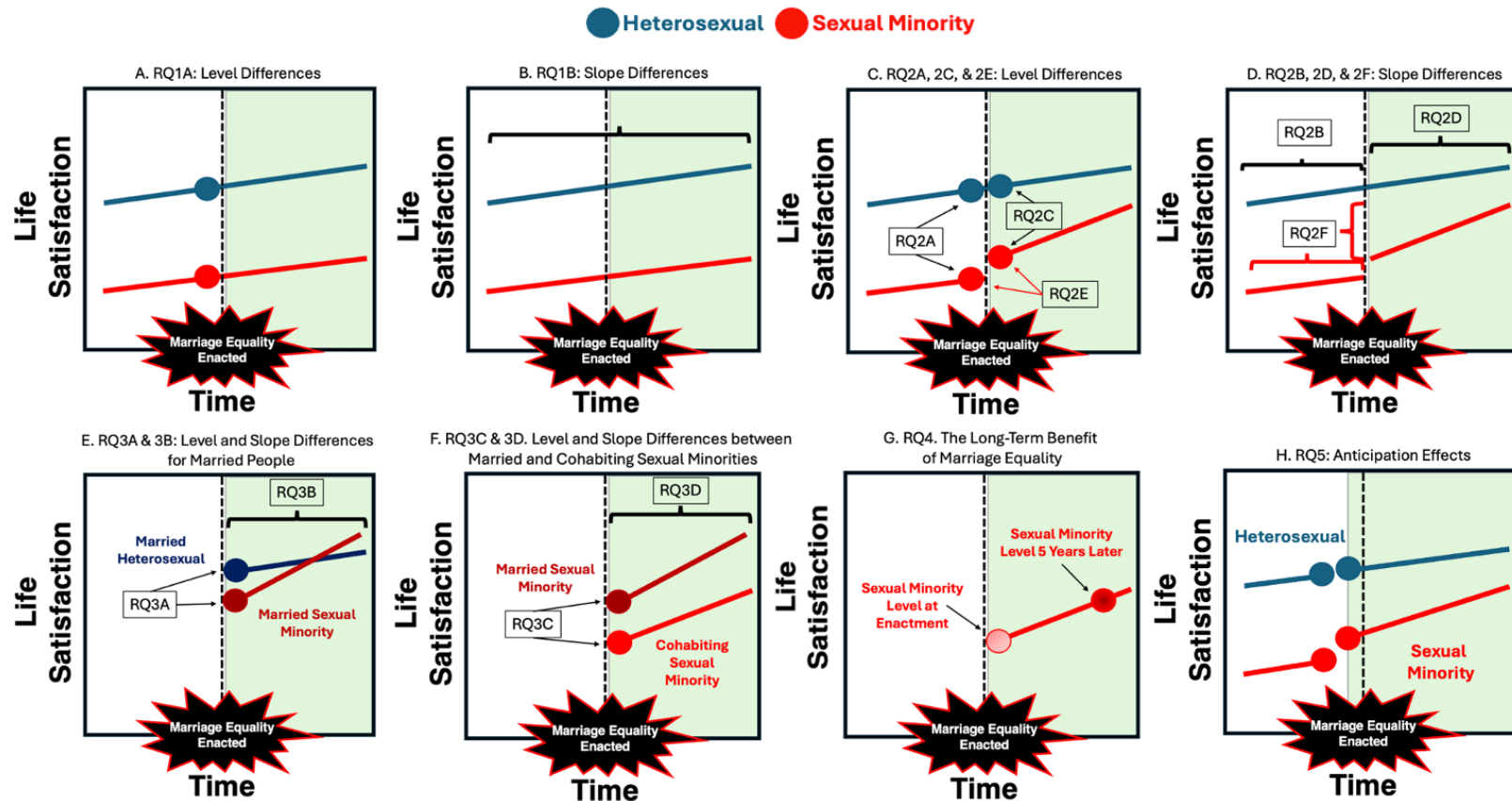


Figure 2-2. Study research questions. A) Research Question (RQ) 1A examines life satisfaction level differences between sexual minorities and heterosexuals, the year before marriage equality enactment. B) RQ1B examined slope differences in life satisfaction between groups across the entire study period. C) Piecewise growth curve models were estimated to examine level differences between heterosexuals and sexual minorities, the year pre-enactment (RQ2A) and the year upon enactment (RQ2C), as well as differences in pre- and post-enactment levels among sexual minorities (RQ2E). D) Slope differences were examined between groups before (RQ2B) and after (RQ2D) enactment as well as slope differences pre- and post-enactment among sexual minorities (RQ2F). E) I examined whether marriage effects emerged following marriage equality enactment. Life satisfaction level (RQ3A) and slope (RQ3B) differences were compared between married heterosexual and married sexual minorities. F) I further contextualized the effects of marriage by comparing levels (RQ3C) and slopes (RQ3D) between married versus cohabiting sexual minorities. G) I

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examined the long-term effects of marriage equality (RQ4) using linear hypothesis testing by comparing life satisfaction levels of sexual minorities at the time of marriage equality enactment and five years later. H) Finally, I tested for anticipation effects to see whether differences in levels and slopes occurred in the year before enactment, when people may have known it would be voted on.

The Present Study

The current study aims to address the methodological concerns raised above with a representative sample from two longitudinal panel studies from Australia and the United Kingdom using a natural experiment design to approximate the causal effects of marriage equality enactment on the well-being of sexual minorities. Specifically, I compared levels and trajectories of life satisfaction between sexual minorities and heterosexuals. I first examined these differences over time across all available waves in each sample for model-building purposes. I expected that compared to heterosexuals, sexual minorities would report lower levels (H1A) and steeper declines (H1B) in life satisfaction as suggested by minority stress theory.

I then built a piecewise model to capture the life satisfaction levels and trajectories prior to marriage equality and any level and trajectory shifts following its enactment. Regarding between-group comparisons, I expected that before marriage equality enactment, sexual minorities would report lower levels (H2A) of and more declines (H2B) in life satisfaction compared to heterosexuals. Following marriage equality implementation, I expected that the level difference between sexual minorities and heterosexuals would decrease (H2C) and that sexual minorities would report more positive and steeper slopes compared to heterosexuals (H2D). For within-group comparisons, I expected life satisfaction levels to significantly increase (H2E) and trajectories to become more positive (H2F) following marriage equality enactment for sexual minorities. I did not expect any differences in life satisfaction levels and slopes for heterosexuals pre- and post-enactment (H2G). I expected findings to converge across both panel samples. I further aimed to contextualize the findings of marriage equality by examining 1) age and gender differences in these effects, 2) marriage effects for sexual minorities, 3) whether the effects of marriage equality persisted five years after enactment, and 4) any anticipation effects.

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First, known age effects exist in well-being (Baird et al., 2010; Buecker et al., 2023), while there is no difference between cisgender men and women (Batz-Barbarich et al., 2018). Yet, it is unclear whether to expect age and gender differences in the impact of marriage equality to exist for these groups.

Second, I examined whether life satisfaction level shifts occurred for sexual minorities who became married following the policy change. Research on the effects of marriage suggests that well-being decreases modestly following marriage (Bühler et al., 2024; Luhmann et al., 2012; Luhmann & Eid, 2009). However, it is unclear whether these effects generalize to samples of sexual minorities, given that they were not previously afforded the same opportunities. Furthermore, many sexual minorities were in long-term committed relationships (e.g., cohabitation, domestic partnerships) before same-sex marriage was legalized, and these types of relationships could mirror marriage. I, therefore, explored the effect of marriage on sexual minorities by a) comparing the effects of marriage following marriage equality between sexual minorities and heterosexuals (H3A & H3B) and b) comparing whether sexual minorities who remained in cohabiting relationships or domestic partnerships versus getting married (H3C & H3D) experienced differences in life satisfaction levels and changes.

Third, I examined whether the effects of marriage equality lasted five years after enactment. This test provides evidence as to whether the effects of marriage equality persist in the long term. I expected the effects to remain five years later across both samples (H4).

Lastly, I examined whether there were any anticipation effects for marriage equality enactment. In most cases, citizens are aware that legislation is passed before being signed into law. Knowing that marriage equality enactment will be implemented can serve as a signal of social acceptance, which may lead to shifts in life satisfaction for sexual minorities before it is

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signed into law. However, few studies have examined the anticipation effects of marriage equality enactment. As such, I additionally explored whether the data was best explained by a model that captured life satisfaction differences the year prior to marriage equality or the year it was implemented (H5).

Methods

Data & Participants

HILDA

The Household, Income, and Labour Dynamics in Australia (HILDA) (Watson & Wooden, 2012) is an ongoing longitudinal panel study that started in 2001. HILDA follows over 17,000 individuals each year. Data is available at <https://dataverse.ada.edu.au/dataverse/DSSLongitudinalStudies> through application. Sample sizes at each wave used in this study ranged from 12,396 (W4) to 17,687 (W16). The mean age at marriage equality enactment was 45.36 years (SD = 21.41 years). Regarding participants' gender, 48.51% of participants identified as male, 51.49% as female. Regarding sexual identity, 54.86% of participants identified as straight, 4.18% identified as a sexual minority, and 40.95% did not report their sexual identity.

UKHLS

The UK Household Longitudinal Study (UKHLS) (University of Essex, Institute for Social and Economic Research, 2023) is an ongoing longitudinal panel study in the United Kingdom that started in 2009. UKHLS includes participants from a previous panel study (British Household Panel Study) who were invited to partake in UKHLS. I therefore included data from these participants in this study. UKHLS surveys over 40,000 households annually. Data is available at <https://beta.ukdataservice.ac.uk/datacatalogue/series/series?id=2000053> through

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application. Sample sizes at each wave ranged from 9,032 (BHPS W6) to 43,401 (UKHLS W2).

The mean age at marriage equality enactment was 46.76 years (SD = 20.61 years). Regarding participants' gender, 40.65% identified as male, 47.46% identified as female, and 11.89% did not provide any information on their gender. Regarding sexual identity, 52.67% of participants identified as straight, 2.66% identified as a sexual minority, and 44.67% did not report their sexual identity.

Measures

Life Satisfaction

Life satisfaction was measured using single items in both panel studies. In HILDA, life satisfaction was measured with the item "All things considered, how satisfied are you with your life," on a Likert scale from 0 (*totally dissatisfied*) to 10 (*totally satisfied*). In UKHLS, life satisfaction was measured with the item "How satisfied are you with: Your life overall," on a Likert scale from 1 (*completely dissatisfied*) to 7 (*completely satisfied*). I POMP (Percent of the Maximum Possible (P. Cohen et al., 1999) scored the life satisfaction variables to range from 0 to 100 so that all effects can be interpreted as percentage increases or decreases in life satisfaction. Participants were excluded if they did not provide any life satisfaction data.

Sexual Minority Status

In both HILDA and UKHLS, participants indicated whether they identify as a sexual minority or heterosexual. In HILDA, participants were asked in 2012, 2016, and 2020 "Which of the following categories best describes how you think of yourself?" with 1 = *Heterosexual or Straight*, 2 = *Gay or Lesbian*, 3 = *Bisexual*, 4 = *Other*, 5 = *Unsure/Don't Know*, and 6 = *Prefer not to say*. In UKHLS, participants were asked about their sexual identity starting in 2011. Specifically, these participants were asked, "Which of the following options best describes how

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you think of yourself?” with 1 = *Heterosexual or Straight*, 2 = *Gay or Lesbian*, 3 = *Bisexual*, 4 = *Other*, and 5 = *Prefer not to say*.

I created a binary sexual minority variable (0 = heterosexual/straight, 1 = sexual minority) to include in the models. Any participant who identified as gay/lesbian, bisexual, or other at any point during the study period was coded as 1. Participants who did not provide any sexual orientation data or responded either *Unsure/Don't know* or *Prefer not to say* consistently in either study were also excluded from analyses.

Time

The time variable was captured in the years participants provided data at each wave. I generated multiple time variables to capture levels and trajectories of life satisfaction pre- and post-marriage equality enactment. A pre-time variable was coded as $t = (-X, 0]$ for waves before marriage equality legislation and 0 after to only identify levels and changes before marriage equality enactment (Australia: before 2017; UK: before 2013). A binary marriage equality variable was created to capture the years before marriage equality was enacted (0) and the years when marriage equality was legalized (1) in Australia (2017) and the UK (2014). Lastly, the post-time slope was coded as $t = [0, X)$ for waves after legislation and 0 before. For anticipation effects, I created separate time variables to capture time before and when it was known that marriage equality was approved/voted but not yet written into law. I followed a similar logic to the original time coding scheme but shifted values one year less to coincide with the year prior to marriage equality (Australia: 2016; UK: 2013). These time variables were used to recover life satisfaction levels and slopes through linear combinations.

Age

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Participants' year of birth was recorded when they first joined the panel. Age was centered at the year prior to marriage equality enactment in each participant's respective country.

Gender

Participants reported their gender when they first joined the panel. I coded the gender variable such that 1 = female and 0 = male. If there were any inconsistencies in participants' gender, I used the modal gender identification.

Civil Partnerships/De Facto Relationships versus Married

I also examined the effects of getting married on life satisfaction following marriage equality enactment. I specifically compared married heterosexuals to married sexual minorities and married sexual minorities to sexual minorities in civil partnerships/de facto relationships. For model convergence purposes in both datasets, I coded marital status before the years of enactment as 0 so any cases were not removed. The marital status variable was coded as NA for the years marriage equality was legal and participants did not report being married or in a civil partnership.

Every year in HILDA, participants provided their marital status to the item "Which of these best describes your current marital status?" A derived marital status variable was then created by HILDA to determine whether participants were *Legally married* (1), *De facto* (2), *Separated* (3), *Divorced* (4), *Widowed* (5), and *Never married and not de facto* (6). I created a binary variable that specifically focused on *Legally married* (1 to 1) and *De facto* (2 to 0) to capture these effects. Regarding marital status, 5.37% of participants reported being legally married after marriage equality enactment (e.g., new marriage), while 12.74% reported being in cohabiting relationships.

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Each year in UKHLS, participants are asked, “What is your legal marital status?”

Participants indicate whether they are *Single, never married/civil partnerships* (1), *Married* (2), *Civil Partner (legal)* (3), *Separated, legally married* (4), *Divorced* (5), *Widowed* (6), *Separated from Civil Partner* (7), *A former Civil Partner* (8), or *Surviving Civil Partner* (9). For UKHLS, I created a similar binary marital status variable focusing on *Married* (2) and *Civil Partner (legal)* (3). Similar to the HILDA marital status variable, I created a binary variable that specifically focused on *Married* (2 to 1) and *Civil Partner (legal)* (3 to 0) to capture these effects. Regarding marital status, 11.61% of participants reported being legally married after marriage equality enactment (e.g., new marriage), while 2.71% reported being in cohabiting relationships.

Analysis Plan

I ran multi-level growth curve and piecewise models separately for HILDA and UKHLS for all research questions (see Figure 2-2) using the *lme4* package (Bates et al., 2015). All models were run with all available data. I first estimated an unconditional model and then included time and sexual minority status in a stepwise fashion to (1) describe the trends in the data and (2) examine variability in levels and slopes to see if piecewise models could be constructed (RQ1). I additionally reran all relevant models in RQ2 to account for gender and age. All effects whose 99% confidence intervals do not contain 0 were considered significant. I used linear combinations to compare different sets of life satisfaction levels and trajectory differences across specific groups. In these cases, I considered nonoverlapping confidence intervals as significantly different across groups and overlapping confidence intervals as no significant differences.

Results

I report information about findings from the two longitudinal panel studies separately and synthesize the convergence and divergence in findings. The time variable used to capture life

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satisfaction changes can be interpreted in years. Because I POMP (Percent of Maximum Possible) (P. Cohen et al., 1999) scored the life satisfaction variable, intercepts and levels can be considered out of 100%, all effect sizes can be interpreted as percentage increases and decreases in life satisfaction, and changes can be interpreted as percent change per year.

Research Question 1: General Level and Slope Differences

Before examining the effects of marriage equality, I first examined whether sexual minorities report differences in life satisfaction levels and slopes in a stepwise fashion. I first estimated unconditional models to capture the grand mean of life satisfaction in both samples. Life satisfaction was centered in the models to the year before marriage equality was enacted into law (HILDA: 2016; UKHLS: 2013). Intraclass coefficients for the unconditional models were .26 and .21 for HILDA and UKHLS, respectively, indicating larger within-person variance than between-person variance in life satisfaction. Table 2-1 includes the estimates from the unconditional models. For HILDA, the grand mean of the year prior to marriage equality enactment was 79.24% (99% CI [79.10%, 79.40%]) with significant individual differences (SD = 10.77%, 99% CI [10.46%, 10.90%]). For UKHLS, life satisfaction levels were estimated to be at 69.27% (99% CI [69.12%, 69.42%]) with significant individual differences (SD = 15.40%, 99% CI [15.28%, 15.53%]). Overall, people reported generally high levels of life satisfaction on average across both samples.

I then included time (years) as a predictor in the model to capture the overall change across time in both samples. Participants reported modest declines in both HILDA ($b = -.05\%$,

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Table 2-1

Effect sizes from RQ1 models examining level and slope differences in life satisfaction.

Model	Dataset	Intercept		Time		SM	Time * SM
		b [99% CI]	SD RE [99% CI]	b [99% CI]	SD RE [99% CI]	b [99% CI]	b [99% CI]
Intercept Only (Unconditional Model)	HILDA	79.24 [79.10, 79.40]	10.77 [10.46, 10.90]	-	-	-	-
	UKHLS	69.27 [69.12, 69.42]	15.40 [15.28, 15.53]	-	-	-	-
Time Included	HILDA	78.99 [78.81, 79.16]	10.87 [10.73, 11.02]	-.05 [-.07, -.04]	.63 [.61, .64]	-	-
	UK	69.04 [68.89, 69.20]	15.17 [15.04, 15.30]	-.14 [-.15, -.12]	.88 [.86, .90]	-	-
SM Status Included	HILDA	79.73 [79.53, 79.93]	10.25 [10.11, 10.40]	-.05 [-.06, -.03]	.61 [.59, .62]	-3.86 [-4.62, -3.10]	-.13 [-.19, -.07]
	UK	69.82 [69.63, 70.01]	14.88 [14.73, 15.03]	-.14 [-.16, -.12]	.94 [.91, .96]	-6.32 [-7.19, -5.44]	-.13 [-.23, -.03]

Note. Brackets represent 99% confidence intervals. Bolded values indicate significant effects whose confidence intervals did not contain zero. All effect sizes can be considered as percentages. HILDA = Household, Income, and Labour Dynamics of Australia. UKHLS = United Kingdom Household Longitudinal Study. SM = Sexual minority status. SD RE = Random effects as standard deviations.

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99% CI [-.07%, -.04%]) and UKHLS ($b = -.14\%$, 99% CI [-.15%, -.12%]), suggesting a $\sim 0.1\%$ decrease in life satisfaction per year across participants in both the Australian and UK samples (i.e. approximately 1% change per decade) (see Table 2-1). There were notable individual differences in how people changed over time in both samples as well (HILDA: $SD = .63\%$, 99% CI [.61%, .64%]; UKHLS: $SD = .88\%$, 99% CI [.86%, .90%]). For HILDA, this means that 50% of the sample is expected to demonstrate at least $|4\%|$ change in their well-being over a decade (i.e. have an effect size less than -0.47% [a $\sim 5\%$ decline over a decade] or over 0.37% [a $\sim 4\%$ increase over a decade]). For UKHLS, this means that 50% of the sample is expected to demonstrate at least $|5\%|$ change in their well-being over a decade (i.e. have an effect size less than -0.73% [a decline of $\sim 7\%$ over a decade] or greater than 0.45% [an increase of $\sim 5\%$ over a decade]).

I then included the binary sexual minority status variable as a predictor in these models to estimate level (RQ1A) and slope (RQ1B) differences between heterosexuals and sexual minorities. As noted in Table 2-1, sexual minorities reported significantly lower life satisfaction levels for HILDA ($b = -3.86\%$, 99% CI [-4.62%, -3.10%]) and UKHLS ($b = -6.32\%$, [-7.19%, -5.44%]). In other words, sexual minorities generally reported 4% lower life satisfaction levels than heterosexuals in HILDA and about 6% lower than heterosexuals in UKHLS. Regarding slopes, sexual minorities were found to report a modest 0.1% faster decline in life satisfaction per year than heterosexuals in both HILDA ($b = -.13\%$, 99% CI [-.19%, -.07%]) and UKHLS ($b = -.13\%$, 99% CI [-.23%, -.03%]). Table 2-2 provides the actual estimates from linear combinations of each group's average life satisfaction levels and slopes. As seen in Figure 2-3, there were significant individual differences in slopes in both HILDA ($SD = .61\%$, 99% CI [.59%, .62%]) and UKHLS ($SD = .94\%$, 99% CI [.91%, .96%]) across sexual identity groups.

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Table 2-2

Estimated values from linear combinations of the effects of marriage equality.

		HILDA			UKHLS	
Term		<i>Estimate [99% CI]</i>			<i>Estimate [99% CI]</i>	
RQ1. Group Difference	Sexual Minority	Heterosexual	Difference	Sexual Minority	Heterosexual	Difference
Level	75.87 [75.14, 76.60]	79.73 [79.53, 79.93]	-3.86 [-4.62, -3.10]	63.50 [62.65, 64.36]	69.82 [69.63, 70.01]	-6.32 [-7.19, -5.44]
Slope	-.18 [-.24, -.12]	-.05 [-.06, -.03]	-.13 [-.19, -.07]	-.27 [-.37, -.17]	-.14 [-.16, -.12]	-.13 [-.23, -.03]
RQ2. Pre-Post	Sexual Minority	Heterosexual	Difference	Sexual Minority	Heterosexual	Difference
Pre-Level	75.93 [75.04, 76.83]	79.54 [79.30, 79.78]	-3.61 [-4.53, -2.68]	62.08 [60.88, 63.27]	69.04 [68.79, 69.29]	-6.96 [-8.18, -5.74]
Post-Level	75.61 [74.68, 76.54]	79.70 [79.44, 79.95]	-4.08 [-5.04, -3.12]	64.55 [63.36, 65.73]	70.50 [70.24, 70.76]	-5.95 [-7.16, -4.74]
Pre-Slope	-.19 [-.28, -.09]	-.07 [-.10, -.05]	-.11 [-.21, -.01]	-.67 [-.88, -.46]	-.31 [-.35, -.27]	-.36 [-.57, -.15]
Post-Slope	-.07 [-.24, .10]	.03 [-.02, .07]	-.09 [-.27, .08]	-.39 [-.59, -.20]	-.21 [-.25, -.16]	-.19 [-.38, .01]
RQ2. Within-Group	Pre-Enactment	Post-Enactment	Difference	Pre-Enactment	Post-Enactment	Difference
SM Level	75.93 [75.04, 76.83]	75.61 [74.68, 76.54]	-.32 [-1.06, .42]	62.08 [60.88, 63.27]	64.55 [63.36, 65.73]	2.47 [1.24, 3.70]
Heterosexual Level	79.54 [79.30, 79.78]	79.70 [79.44, 79.95]	.16 [-.04, .36]	69.04 [68.79, 69.29]	70.50 [70.24, 70.76]	1.46 [1.20, 1.72]
Level Diff (SM vs Het)	-.32 [-1.06, .42]	.16 [-.04, .36]	-.48 [-1.24, .29]	2.47 [1.24, 3.70]	1.46 [1.20, 1.72]	1.01 [-.24, 2.26]

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SM Slope	-.19 [-.28, -.09]	-.07 [-.24, .10]	.12 [-.08, .32]	-.67 [-.88, -.46]	-.39 [-.59, -.20]	.28 [-.01, .57]
Heterosexual Slope	-.07 [-.10, -.05]	.03 [-.02, .07]	.10 [.05, .16]	-.31 [-.35, -.27]	-.21 [-.25, -.16]	.11 [.05, .17]
Slope Diff (SM vs Het)	.12 [-.08, .32]	.10 [.05, .16]	.02 [-.19, .22]	.28 [-.01, .57]	.11 [.05, .17]	.17 [-.13, .47]
RQ3. Marriage	Married SM	Married Het	Difference	Married SM	Married Het	Difference
Level	78.74 [76.33, 81.15]	81.52 [80.78, 82.24]	-2.77 [-5.29, -.25]	70.20 [66.85, 73.55]	73.18 [72.37, 73.98]	-2.98 [-6.43, .47]
Slope	-.00 [-.54, .54]	-.13 [-.30, .03]	.13 [-.43, .69]	-.59 [-1.11, -.06]	-.42 [-.55, -.29]	-.17 [-.71, .37]
RQ3. Within SM	Married SM	Cohabit SM	Difference	Married SM	Cohabit SM	Difference
Level	78.74 [76.33, 81.15]	76.19 [74.85, 77.53]	2.57 [-.05, 5.19]	70.20 [66.85, 73.55]	70.03 [65.81, 74.24]	.17 [-5.20, 5.55]
Slope	-.00 [-.54, .54]	-.07 [-.36, .23]	.06 [-.55, .68]	-.59 [-1.11, -.06]	-.24 [-.92, .44]	-.34 [-1.20, .51]
RQ4. 5-Year Benefit	Enacted	5 Year	Difference	Enacted	5 Year	Difference
SM	75.61 [74.68, 76.54]	75.27 [74.43, 76.12]	-.34 [-1.18, .50]	64.55 [63.36, 65.73]	62.59 [61.63, 63.54]	-1.96 [-2.93, -1.00]
Heterosexual	79.70 [79.44, 79.95]	79.83 [79.59, 80.06]	.13 [-.10, .37]	70.50 [70.24, 70.76]	69.47 [69.25, 69.70]	-1.03 [-1.24, -.81]
Diff Between Diffs	-.34 [-1.18, .50]	.13 [-.10, .37]	-.47 [-1.33, .40]	-1.96 [-2.93, -1.00]	-1.03 [-1.24, -.81]	-.94 [-1.92, .05]

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RQ5.	Sexual	Heterosexual	Difference	Sexual Minority	Heterosexual	Difference
Anticipation	Minority					
Pre-Level	76.18	79.58	-3.40	63.04	69.86	-6.82
	[75.27, 77.08]	[79.33, 79.82]	[-4.34, -2.46]	[61.84, 64.24]	[69.61, 70.11]	[-8.04, -5.59]
Post-Level	75.77	79.69	-3.92	63.80	69.65	-5.85
	[74.85, 76.69]	[79.44, 79.95]	[-4.88, -2.97]	[62.61, 65.00]	[69.39, 69.91]	[-7.07, -4.63]
Pre-Slope	-.18	-.08	-.10	-.61	-.21	-.40
	[-.28, -.07]	[-.10, -.05]	[-.20, .01]	[-.83, -.39]	[-.26, -.17]	[-.62, -.17]
Post-Slope	-.09	.02	-.11	-.22	-.04	-.18
	[-.23, .06]	[-.02, .06]	[-.26, .04]	[-.39, -.04]	[-.08, -.001]	[-.36, .00]
RQ5. Within-Group	Pre-Vote	Post-Vote	Difference	Pre-Vote	Post-Vote	Difference
SM Level	76.18	75.77	-.41	63.04	63.80	.76
	[75.27, 77.08]	[74.85, 76.69]	[-1.15, .34]	[61.84, 64.24]	[62.61, 65.00]	[-.47, 1.99]
Heterosexual	79.58	79.69	.11	69.86	69.65	-.21
Level	[79.33, 79.82]	[79.44, 79.95]	[-.08, .31]	[69.61, 70.11]	[69.39, 69.91]	[-.46, .05]
Level Diff	-.41	.11	-.52	.76	-.21	.96
(SM vs Het)	[-1.15, .34]	[-.08, .31]	[-1.29, .25]	[-.47, 1.99]	[-.46, .05]	[-.29, 2.22]
SM Slope	-.18	-.09	.09	-.61	-.22	.39
	[-.28, -.07]	[-.23, .06]	[-.09, .27]	[-.83, -.39]	[-.39, -.04]	[.10, .68]
Heterosexual	-.08	.02	.10	-.21	-.04	.17
Slope	[-.10, -.05]	[-.02, .06]	[.05, .15]	[-.26, -.17]	[-.08, -.00]	[.12, .23]
Slope Diff	.09	.10	-.01	.39	.17	.21
(SM vs Het)	[-.09, .27]	[.05, .15]	[-.20, .18]	[.10, .68]	[.12, .23]	[-.08, .52]

Note. Brackets represent 99% confidence intervals. Bolded values represent significant effects whose confidence intervals did not contain zero. All effect sizes can be considered as percentages. HILDA = Household, Income, and Labour Dynamics of Australia. UKHLS = United Kingdom Household Longitudinal Study. SM = Sexual minority. Het = Heterosexual.

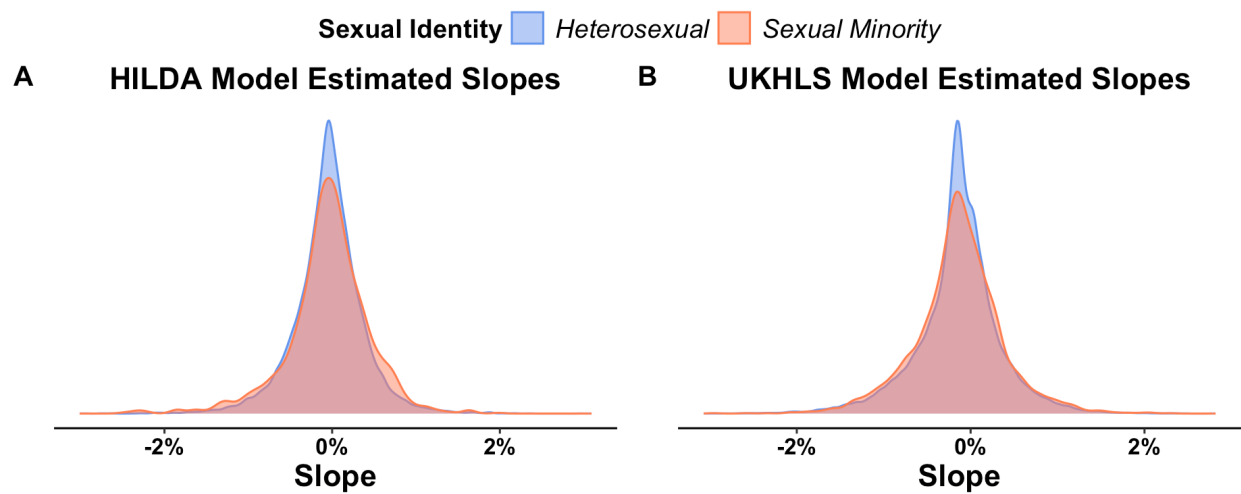


Figure 2-3. RQ1 slope density distributions across sexual identities. A) HILDA slope distributions. B) UKHLS slope distributions.

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Given these individual differences, I was able to construct piecewise growth models to examine the effects of marriage equality and predict potential individual differences in pre- and post-enactment life satisfaction levels and slopes.

Research Question 2: The Effects of Marriage Equality

To examine the effects of marriage equality, I used piecewise growth curve models to capture level and slope differences between sexual minorities and heterosexuals before and after marriage equality enactment.

Level Differences

First, I examined differences in levels of life satisfaction (1) across groups pre- (RQ2A) and post-enactment (RQ2C), and (2) within-groups (RQ2E) across marriage equality (i.e. pre-post differences). Effect sizes are reported in Table 2-3. Before marriage equality was enacted, sexual minorities reported lower levels of life satisfaction in HILDA ($b = -3.61\%$, 99% CI $[-4.53\%, -2.68\%]$; i.e. a $\sim 4\%$ difference) and UKHLS ($b = -6.96\%$, 99% CI $[-8.18\%, -5.74\%]$; i.e. a $\sim 7\%$ difference). Differences persisted after marriage equality was enacted, with sexual minorities continuing to report lower levels of life satisfaction in HILDA (estimate = -4.08% , 99% CI $[-5.04\%, -3.12\%]$; i.e. a $\sim 4\%$ difference) and UKHLS (estimate = -5.95% , 99% CI $[-7.16\%, -4.74\%]$; a $\sim 6\%$ difference). Thus, pre-post differences in levels of life satisfaction did not differ between heterosexuals and sexual minorities in HILDA ($b = -.05\%$, 99% CI $[-.12\%, .03\%]$) or UKHLS ($b = .10\%$, 99% CI $[-.02\%, .23\%]$). Model estimated levels of life satisfaction from linear combinations can be found in Table 2-2.

Within groups, pre-post differences were less consistent across samples. In HILDA, neither sexual minorities (estimate = $-.32\%$, 99% CI $[-1.06\%, .42\%]$) nor heterosexuals ($b = .16\%$, 99% CI $[-.04\%, .36\%]$) demonstrated pre-post level differences. For UKHLS, in contrast,

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Table 2-3

Effect sizes from RQ2 models examining level and slope differences in the effects of marriage equality on life satisfaction.

Dataset	Intercept		SM	Pre-Enactment		Pre-Enactment * SM	Year Enacted		Year Enacted * SM	Post-Enactment		Post-Enactment * SM
	b	SD RE	b	b	SD RE	b	b	SD RE	b	b	SD RE	b
	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]	[99% CI]
HILDA	79.54	11.53	-3.61	-.07	.80	-.11	.16	4.88	-.48	.03	1.17	-.09
	[79.30,	[11.34,	[-4.53,	[-.10,	[.77,	[-.21,	[-.04,	[4.59,	[-1.24,	[-.02,	[1.11,	[-.27,
	79.78]	11.71]	-2.68]	-.05]	.82]	-.01]	.36]	5.15]	.29]	.07]	1.24]	.08]
UKHLS	69.04	16.89	-6.96	-.31	1.20	-.36	1.46	9.51	1.01	-.21	1.70	-.19
	[6.88,	[16.67,	[-8.18,	[-.35,	[1.15,	[-.57,	[1.20,	[9.13,	[-.24,	[-.25,	[1.64,	[-.38,
	6.93]	17.10]	-5.74]	-.27]	1.24]	-.15]	1.72]	9.89]	2.26]	-.16]	1.76]	.01]

Note. Brackets represent 99% confidence intervals. Bolded values indicate significant effects whose confidence intervals did not contain zero. All effect sizes can be considered as percentages. HILDA = Household, Income, and Labour Dynamics of Australia. UKHLS = United Kingdom Household Longitudinal Study. SM = Sexual minority status. SD RE = Random effects as standard deviations.

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both sexual minorities and heterosexuals reported higher levels of life satisfaction following enactment. Specifically, sexual minorities (estimate = 2.47%, 99% CI [1.24%, 3.70%]; i.e. a ~2.5% bump in life satisfaction) and heterosexuals ($b = 1.46\%$, 99% CI [1.20%, 1.72%]; i.e. a ~1.5% bump) reported higher levels of life satisfaction immediately following marriage equality enactment. However, the pre-post level difference in life satisfaction for sexual minorities was not different from heterosexuals ($b = 1.01\%$, 99% CI [-.24%, 2.26%]), suggesting that marriage equality enactment was not the primary driver of the bump in life satisfaction that year.

I then examined whether age (centered at the year before marriage equality enactment) and gender (cisgender man/woman) were associated with any of the level differences between and within-sexual identities. Age and gender associations can be found in Table S2-1. While a few associations were found with age, they were quite modest. For instance, older sexual minorities reported slightly higher pre-enactment levels of life satisfaction compared to heterosexuals and younger sexual minorities ($b = .06\%$, 99% CI [.01%, .11%]; i.e. ~0.1% higher levels of life satisfaction) in HILDA. In UKHLS, older adults in general reported slightly higher pre-enactment levels ($b = .03\%$, 99% CI [.02%, .05%]). Regarding gender, only one association emerged in HILDA such that women reported higher post-enactment levels of life satisfaction on average compared to men ($b = .56\%$, 99% CI [.16%, .96%]; i.e. ~1% higher levels of life satisfaction). Taken together, age and gender explained little of the variability in pre- and post-levels in life satisfaction.

Slope Differences

Next, I investigated changes in life satisfaction pre- and post-marriage equality enactment. As with levels, I report (1) differences in slopes across groups pre- (RQ2B) and post-enactment (RQ2D) and (2) differences in slopes within groups across time (RQ2F). Across

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groups, sexual minorities were found to report greater declines in life satisfaction before marriage equality enactment than heterosexuals in both HILDA ($b = -.11\%$, 99% CI $[-.21\%, -.01\%]$) and UKHLS ($b = -.36\%$, 99% CI $[-.57\%, -.15\%]$) (see Table 2-3). Across a decade, these differences accumulated into an additional $\sim 1\%$ (HILDA) and $\sim 4\%$ (UKHLS) difference in life satisfaction between heterosexuals and sexual minorities. After marriage equality enactment, differences in slopes between heterosexuals and sexual minorities did not persist in either HILDA ($b = -.09\%$, 99% CI $[-.27\%, .08\%]$) or UKHLS ($b = -.19\%$, 99% CI $[-.38\%, .01\%]$). Estimated slopes for each group from linear combinations can be found in Table 2-2.

Within groups, pre-post differences in slopes were relatively consistent across samples. In HILDA, heterosexuals reported a significant pre-post slope difference in HILDA (estimate = $.10\%$, 99% CI $[.05\%, .16\%]$), while sexual minorities had no pre-post slope differences (estimate = $.12\%$, 99% CI $[-.08\%, .32\%]$). For heterosexuals, this indicates that prior to enactment, heterosexual individuals reported a decrease of $.07\%$ each year (99% CI $[-.10\%, -.05\%]$), but after enactment reported no change (i.e. stable levels) in life satisfaction ($b = .03\%$, 99% CI $[-.02\%, .07\%]$). For sexual minorities, although they, like heterosexuals, reported decreases in life satisfaction before enactment (estimate = $-.19\%$, 99% CI $[-.28\%, -.09\%]$) and then no change post-enactment (estimate = $-.07\%$, 99% CI $[-.24\%, .10\%]$), there were no significant differences between these pre- and post-slopes. A similar trend emerged for UKHLS, such that heterosexuals reported pre-post slope differences in life satisfaction changes (estimate = $.11\%$, 99% CI $[.05\%, .17\%]$; i.e. less pronounced decreases), whereas sexual minorities showed no pre-post slope differences (estimate = $.28\%$, 99% CI $[-.01\%, .57\%]$). Overall, the implementation of marriage equality seemed to prevent further between-group differences in life satisfaction trajectories but did not seem to affect pre-post level differences as expected for sexual minorities.

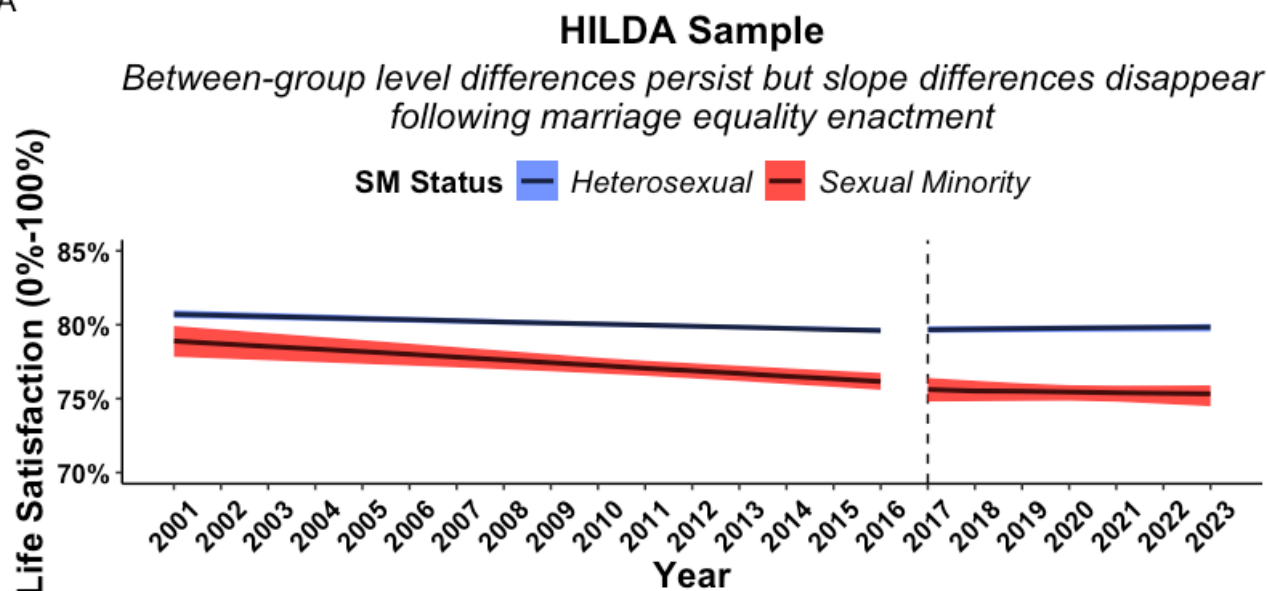
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Finally, I examined the degree to which age and gender were associated with changes in life satisfaction pre- and post-enactment (see Table S2-1 for these effects). For HILDA, age was associated with pre- and post-slopes for all participants, such that older adults generally reported more modest declines in life satisfaction before enactment ($b = .002\%$, 99% CI $[-.001\%, .003\%]$) and slightly steeper increases post-enactment ($b = .01\%$, 99% CI $[-.01\%, .01\%]$). Older sexual minority adults also experienced more modest declines before enactment ($b = .006\%$, 99% CI $[-.002\%, .010\%]$). For UKHLS, age was only associated with post-enactment slopes, such that older adults generally reported slightly slower declines over time ($b = .01\%$, 99% CI $[-.01\%, .01\%]$). There were no associations with gender for life satisfaction slopes. In sum, while general age effects were consistent with the aging literature (Baird et al., 2010; Buecker et al., 2023), age and gender did not explain changes for sexual minorities in relation to marriage equality legislation implementation specifically. I, therefore, aimed to examine another contextual factor, marriage, to understand the effects of marriage equality.

Research Question 3: Effects of Marital Status Following Marriage Equality Enactment

I next examined whether individual differences in life satisfaction levels and changes post-marriage equality enactment could be explained by sexual minorities who got legally married. Married individuals tend to report slightly higher levels of life satisfaction on average, but experience slightly steeper decreases in life satisfaction over time compared to those who are not (Bühler et al., 2024; Luhmann et al., 2012; Luhmann & Eid, 2009). However, it is unclear if marriage-related differences in life satisfaction among heterosexuals are also present among sexual minorities after restrictions on marriage were lifted. I therefore examined level (RQ3A) and slope (RQ3B) differences in life satisfaction between married heterosexuals and married

A



B

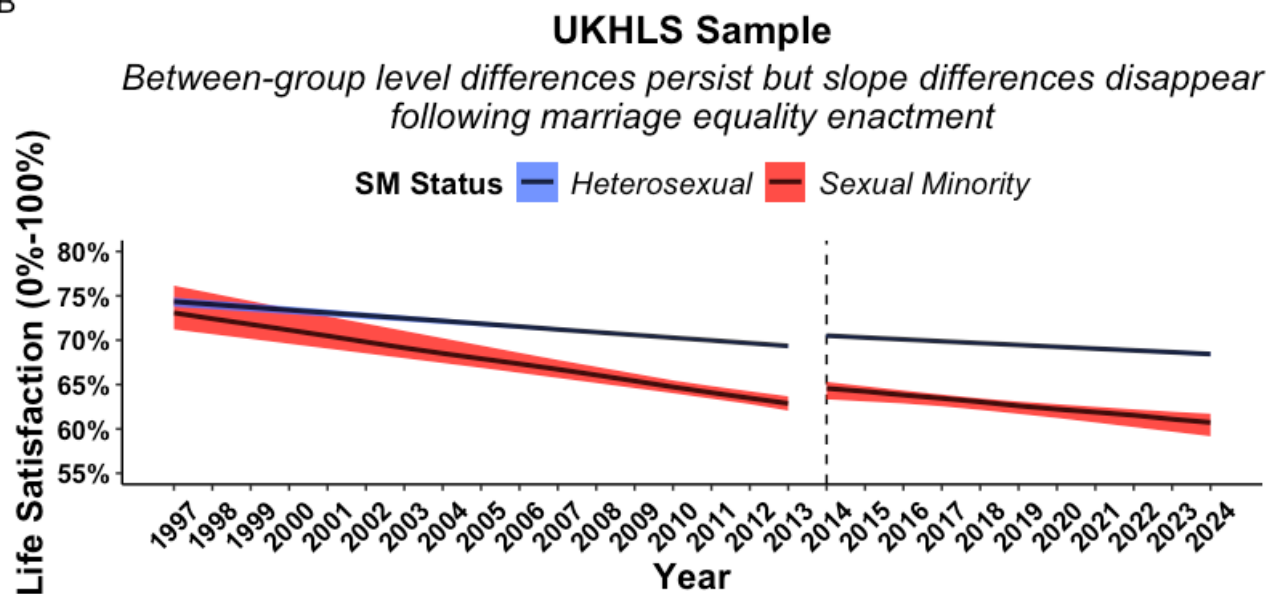


Figure 2-4. Effects of marriage equality enactment across heterosexual and sexual minority people. A) Results from the Australian sample. B) Results from the UK sample.

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sexual minorities following the enactment of marriage equality. Furthermore, it is important to tease apart the effects of marriage from being in a committed relationship, such as ones where couples live together (Perelli-Harris et al., 2019). To account for this, I also examined the level (RQ3C) and slope (RQ3D) differences in life satisfaction between sexual minorities who got married post-marriage equality enactment to those who were in cohabiting relationships. Thus, to understand whether observed patterns are due to marriage equality enactment or simply the benefits of marriage or long-term, cohabiting relationships, I conducted a series of robustness tests. Below, I report the level and slope differences in these comparisons (see Table 2-2 for linear combination estimates and Table S2-2 for effect sizes).

Level Differences

I first examined whether there were level differences in life satisfaction between married heterosexuals and sexual minorities. Married heterosexuals reported higher levels of life satisfaction than married sexual minorities in HILDA (estimate = 2.77%, 99% CI [-5.29%, -.25%], i.e. ~3% post-enactment. However, there were no differences between these groups in UKHLS (estimate = -2.98%, 99% CI [-6.43%, .47%]). I then examined whether there were level differences between married and cohabiting sexual minorities to further disentangle the effects of marriage. However, I found no level differences between these groups in HILDA (estimate = 2.57%, 99% CI [-.05%, 5.19%]) and UKHLS (estimate = .17%, 99% CI [-5.20%, 5.55%]), suggesting that marriage effects were generally unrelated to life satisfaction levels following marriage equality enactment.

Slope Differences

Similar patterns emerged for slope differences. Married heterosexuals and married sexual minorities did not differ in changes in life satisfaction post-enactment in HILDA (estimate =

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.13%, 99% CI [-.43, .69]) or UKHLS (estimate = -.17%, 99% CI [-.71%, .37%]). There were also no differences in post-enactment slopes between cohabiting sexual minorities and sexual minorities who got married in HILDA (estimate = .06%, 99% CI [-.55%, .68%]) and UKHLS (estimate = -.34%, 99% CI [-1.20%, .51%]). In sum, getting married did not seem to explain the effects of marriage equality legislation on life satisfaction, which supports the possibility that observed associations in RQ2 were due to structural changes following marriage equality enactment.

Research Question 4: The Long-Term Benefit of Marriage Equality

I then examined the long-term benefits of marriage equality, as previous research only examined these patterns in the short term. To accomplish this, I used linear combinations to compare life satisfaction levels immediately after marriage equality with levels five years later. For HILDA, sexual minorities reported no significant level differences in life satisfaction from the year of marriage equality enactment to five years later (estimate = -.34%, 99% CI [-1.18%, .50%], see Table 2-2). For UKHLS, and as expected from findings in RQ2F, life satisfaction levels were ~2% lower five years after marriage equality was signed into law for sexual minorities (estimate = -1.96%, 99% CI [-2.93%, -1.00%]). However, these well-being differences among sexual minorities were not different from heterosexuals in both HILDA (estimate = -.52%, 99% CI [-1.29%, .25%]) and UKHLS (estimate = .96%, 99% CI [-.29%, 2.22%]). Said differently, changes in life satisfaction levels over the five-year period were not different between sexual minorities and heterosexuals. These findings align with those of RQ2, suggesting that marriage equality prevented further life satisfaction level differences between these groups.

Research Question 5: Anticipatory Effects of Marriage Equality

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Lastly, I examined anticipation effects to see whether the effects of marriage equality occurred before the year it was enacted, when citizens either voted on (HILDA) or knew it would be voted on by governing bodies (UKHLS). To do this, I reran models with time centered two years before marriage equality enactment (HILDA: 2016; UKHLS: 2013) and compared them to the original models by selecting the model with the lower Bayesian Information Criteria (BIC) (McCoach et al., 2022). For HILDA, the anticipation model (BIC = 900759.00) was a better fit of the data compared to the model accounting for when marriage equality was instated (BIC = 901424.10). For UKHLS, the original model (BIC = 2167745.00) fit the data better than the anticipation model (BIC = 2167943.00). The anticipatory model for HILDA suggested very similar results to the model from RQ2 (see Table 2-2 and S2-3). However, this model suggests that the elimination of post-slope differences occurred in the year Australians voted on the referendum and knew that the law had passed (2016), as opposed to the year it was signed into law.

Discussion

Marriage equality legislation represents one of sexual minorities' many longstanding battles for equal rights (Ogolsky et al., 2019; Williams Institute, 2021; Willetts, 2011; Huang & Liang, 2022). The present study used a natural experiment design to understand how the reduction of structural stigma via the implementation of marriage equality legislation impacted sexual minority well-being in Australia and the United Kingdom. I used a longitudinal design with 6+ waves of data pre- and post-enactment, leveraged comparisons between sexual minorities and heterosexuals, and accounted for individual differences to address several shortcomings of the previous literature linking marriage equality to sexual minority well-being. There were four major findings from this study: (1) sexual minorities reported robust life

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satisfaction level differences compared to heterosexuals; (2) marriage equality enactment resulted in pre-slope differences disappearing post-enactment; (3) demographic variables (age, gender, marital status) did not explain individual differences in the effects of marriage equality; and (4) evidence of anticipation effects for marriage equality on life satisfaction in Australia. I discuss the implications of these findings below.

The Effects of Marriage Equality Enactment on Life Satisfaction

In this study, I replicated previous findings that sexual minorities tend to report lower life satisfaction levels compared to heterosexuals (Bartram, 2023; Bränström et al., 2022; De Miguel et al., 2018; D. Meyer et al., 2023; Perales, 2016; Thomeer & Reczek, 2016; Tolmacz et al., 2023) across both the Australian and UK datasets. These level differences are theorized to exist because sexual minorities face unique identity-based minority stressors due to the lack of acceptance of their minoritized sexual identity (Frost & Meyer, 2023; I. H. Meyer, 2003, 2007). Minority stress theory also argues that reductions in minority stress, such as structural stigma, should reduce the well-being discrepancies between sexual minorities and heterosexuals. Moreover, structural changes place the onus on institutions to change rather than placing the burden to change on affected individuals. Therefore, a primary goal of this study was to test this assumption by examining whether the enactment of marriage equality legislation (1) resulted in reductions in the well-being gap between sexual minorities and heterosexuals and (2) improved sexual minority well-being in general.

While there did not seem to be huge impacts for sexual minorities as a group, I did find that marriage equality eliminated pre-enactment slope differences between sexual minorities and heterosexuals across samples. In other words, marriage equality enactment prevented life satisfaction level differences from getting larger post-enactment. These findings are in line with

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minority stress theory (I. H. Meyer, 2003). As proposed in minority stress theory, reductions in structural stigma have positive benefits for sexual minority well-being (Bränström & Pachankis, 2023; Hatzenbuehler, 2016; Hatzenbuehler et al., 2018), which is aligned with marriage equality implementation preventing further disparities in this study. This study also adds to a growing literature on the effects of marriage equality (Ogolsky et al., 2019; Huang & Liang, 2022; Kennedy & Dalla, 2020; Perales & Todd, 2018), highlighting the need to consider long-term patterns of well-being with comparison groups to approximate the causal effects of marriage equality enactment. Overall, my findings suggest that marriage equality did play a role in sexual minority well-being, albeit small.

Despite marriage equality only having small effects in the aggregate, there were significant individual differences in levels and changes of life satisfaction (see Table 2-2 and Figure 2-3). I therefore aimed to contextualize the effects of marriage equality across age, gender, and marital status to see whether they explained these individual differences. However, only a few age differences emerged. While effect sizes were small ($< .01\%$), these age effects are likely not meaningful in explaining the effects of marriage equality (Funder & Ozer, 2019; Götz et al., 2024) but instead reflect general age-graded well-being trends (e.g., older adults report slightly higher well-being) (Baird et al., 2010; Buecker et al., 2023). Other sociodemographic variables (e.g., race, ethnicity, socioeconomic status) could be used to further contextualize differential well-being patterns for marriage equality. Yet, measures that better capture the intersection of multiple marginalized identities that could help explain individual differences in response to marriage equality are needed (Parmenter & Barrita, 2024; Westberg & Syed, 2024). I also found that while sexual minorities who got married following marriage equality enactment reported lower levels of life satisfaction compared to heterosexuals in the Australian sample, no

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differences in life satisfaction compared to married heterosexuals, and cohabiting sexual minorities suggest that this just reflects general level differences. These findings may also point to the fact that there are differences in norms surrounding marriage. For instance, in both Australia and the UK, these null findings may reflect broader societal shifts in the meaning and importance of marriage (Perelli-Harris et al., 2019). For sexual minorities specifically, these findings could indicate that being in long-term committed relationships functions similarly to marriage. Centering sexual minority experiences and norms, therefore, may be more useful in contextualizing and addressing the role of policy changes and minority stress in sexual minority well-being.

The findings thus far indicate that the effects of marriage equality are much more complex and need further consideration and research. National policy changes like marriage equality might not influence large collective changes in sexual minority well-being because they may not influence social changes in their more local and immediate social environments (e.g., individuals who live in areas with low support for such legislation) (Kennedy & Dalla, 2020; Perales & Todd, 2018). Some cross-sectional research using the HILDA dataset suggested that sexual minorities residing in counties that generally supported marriage equality reported higher levels of well-being following its enactment, while sexual minorities residing in more conservative counties reported drops in well-being (Perales & Todd, 2018). The findings of that study align with social safety theory (Diamond & Alley, 2022; Slavich et al., 2023), which argues that the degree to which minority stress reduction influences well-being is contingent on whether someone continues to perceive threats and rejection of their sexual identity in their social environment. In the aggregate, the effects of marriage equality may, therefore, cancel out, leaving a need for the role of region-specific acceptance of sexual minorities to be further

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investigated. More granular policy changes may also prove to be the most important way to address sexual minority well-being disparities (Bränström & Pachankis, 2023; Van Der Star et al., 2021). More research linking geographical indicators of acceptance and local policy changes is needed to contextualize and uncover the complexity of the effects.

Understanding these effects also requires considering the context of sexual minority acceptance and rights in Australia and the UK. Prior to marriage equality, Australia and the UK were already passing equality legislation that granted same-sex partners various rights. For instance, although same-sex couples could not be legally wed, long-term partners had rights to assets and property (Norrie, 2025) and gained parental rights (Zanghellini, 2010). Marriage equality may not have influenced well-being in these two countries because it legally and socially changed very little for sexual minorities. Same-sex marriage legislation may therefore be more powerful for the well-being of sexual minorities from less accepting countries (Bränström & Pachankis, 2023; Van Der Star et al., 2021). Finally, general life satisfaction is a more stable indicator of subjective well-being, given its evaluative appraisal across all conditions in one's life (Diener, 1984; Diener et al., 2006). Other subjective well-being indicators, such as positive and negative affect and domain satisfaction (Diener, 1984; Rohrer et al., 2024; Schimmack, 2008; Seligman, 2018), as well as indicators of group well-being for sexual minorities (e.g., identity acceptance, identity disclosure rates, reductions in health disparities) (Frost & Meyer, 2023; Perales, 2019; L. M. Roberts & Christens, 2021) may be other dynamic and meaningful outcomes of interest when assessing the effects of marriage equality.

Finally, I looked for the anticipatory effects of marriage equality, as citizens likely knew that parliamentary action on marriage equality was under consideration. Although there were still no effects of marriage equality when considering any anticipation effects, I found that this

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anticipatory model better explained the data for Australia, but not the UK. This may be because in the UK, parliament voted on marriage equality, whereas Australian citizens voted on the referendum. Additionally, the year of marriage equality enactment in the UK coincided with the first attempt for the UK to leave the European Union. Although this first attempt failed, this context may explain why participants experienced a bump in life satisfaction in 2014 regardless of sexual identity. The effects of national identities may therefore have conflicted with sexual identities within the UK. Regarding Australia, these findings indicate that slope differences disappeared in the year when citizens voted on the referendum for marriage equality. These findings further support minority stress theory (Frost & Meyer, 2023; I. H. Meyer, 2003) and social safety theory (Diamond & Alley, 2022; Slavich et al., 2023) by highlighting that signals of social acceptance can result in benefits to sexual minority well-being even before the reductions of structural stigma are actually implemented. Taken together, these findings from the anticipatory model highlight a need for research to consider these temporal and contextual patterns of social acceptance signals.

Limitations and Constraints on Generalizability

This study had numerous strengths in disentangling the effects of marriage equality. First, and most notably, the natural experiment design addressed several shortcomings of the previous research by approximating the causal effects of marriage equality by comparing life satisfaction to heterosexuals. Second, the longitudinal panel design allowed for the use of many waves of data pre- and post-enactment, making for a robust examination of level and slope changes following implementation and an estimation of the long-term effects of marriage equality. Third, I used representative samples from Australia and the UK by using longitudinal panel studies. Fourth, this study had a large sample of sexual minorities, which is typically not seen in the

previous literature. The study was not without its limitations, however. For instance, I used the proxy of the year when participants completed the survey and did not map to the actual enactment date of marriage equality, which may slightly bias some of the findings. Finally, there were also high attrition rates in this study, as is common in large panel studies, and this reduces the reliability of within-person changes and reduces the power to detect small effects.

Conclusion

In sum, this study underscores the importance of marriage equality for sexual minority well-being. While the effects were small on average, marriage equality prevented further disparities in sexual minority well-being from developing over time. Although level differences were not fully eliminated as I hypothesized, the findings indicate that the role of marriage equality is much more complex, and further research is needed to best understand and contextualize its benefits. I therefore see bright futures for leveraging the strengths of natural experiment designs to help further understand how policy and structural changes at a more granular level can influence sexual minority well-being.

Supplemental Materials

Table S2-1

Age and gender effects of marriage equality.

Term	HILDA	UKHLS
	b [99% CI]	b [99% CI]
<i>Age Effects</i>		
Age	-.00 [-.01, .01]	.04 [.02, .05]
Age x SM	.06 [.01, .11]	.03 [-.05, .10]
Age x Pre-Enactment	.002 [.001, .003]	-.001 [-.004, .001]
Age x Pre-Enactment x SM	.006 [.002, .010]	-.004 [-.017, .009]
Age x Year Enacted	.01 [-.01, .02]	-.01 [-.02, .01]
Age x Year Enacted x SM	.01 [-.03, .05]	.05 [-.03, .13]
Age x Post-Enactment	.01 [.01, .01]	.01 [.01, .02]
Age x Post-Enactment x SM	.001 [-.008, .011]	.003 [-.009, .016]
<i>Gender Effects</i>		
Gender	.25 [-.24, .73]	-.32 [-.86, .22]
Gender x SM	-.98 [-2.87, .91]	.86 [-1.80, 3.51]
Gender x Pre-Enactment	-.02 [-.07, .02]	-.04 [-.12, .05]
Gender x Pre-Enactment x SM	.04 [-.16, .24]	.18 [-.26, .63]
Gender x Year Enacted	.56 [.16, .96]	-.20 [-.77, .38]
Gender x Year Enacted x SM	-1.12 [-2.68, .44]	.11 [-2.67, 2.89]
Gender x Post-Enactment	-.05 [-.14, .05]	.001 [-.096, .099]
Gender x Post-Enactment x SM	.02 [-.34, .38]	-.35 [-.79, .09]

Note. Brackets represent 99% confidence intervals. Bolded values indicate significant effects whose confidence intervals did not contain zero. All effect sizes can be considered as percentages. Age was centered at the average age at the year of marriage equality enactment. Gender effects are coded such that effect sizes represent the effects of being a woman. x = Indicates interaction. HILDA = Household, Income, and Labour Dynamics of Australia. UKHLS = United Kingdom Household Longitudinal Study. SM = Sexual minority status.

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Table S2-2

Effects of new marriage versus remaining in a cohabiting relationship.

Term	HILDA		UKHLS	
	b [99% CI]	SD RE [99% CI]	b [99% CI]	SD RE [99% CI]
Intercept	79.30 [79.03, 79.57]	11.91 [10.89, 12.93]	63.93 [62.38, 65.47]	16.26 [15.55, 16.97]
SM	-.32 [-4.26, -2.18]	-	4.63 [.36, 8.90]	-
Pre-Enactment	-.09 [-.11, -.06]	.83 [.46, 1.20]	-.11 [-.24, -.03]	1.32 [1.18, 1.47]
Pre-Enactment x SM	-.08 [-.20, .01]	-	-.59 [-1.13, -.04]	-
Marital Status	.83 [.13, 1.54]	-	6.17 [4.53, 7.81]	-
Year Enacted	-.24 [-.70, .22]	4.37 [2.89, 5.85]	2.88 [1.24, 4.52]	9.83 [8.62, 10.96]
Year Enacted x SM	.35 [-.96, 1.66]	-	-1.41 [-5.84, 3.03]	-
Year Enacted x Marital Status	1.63 [.69, 2.57]	-	.20 [-1.59, 1.99]	-
Year Enacted x SM x Marital Status	-.04 [-2.67, 2.59]	-	2.96 [-2.47, 8.39]	-
Post-Enactment	-.01 [-.12, .11]	1.18 [.55, 1.81]	-.34 [-.62, -.05]	1.70 [1.55, 1.85]
Post-Enactment x SM	-.06 [-.38, .26]	-	.09 [-.64, .83]	-
Post-Enactment x Marital Status	-.13 [-.33, .07]	-	-.08 [-.40, .23]	-
Post-Enactment x SM x Marital Status	.19 [-.45, .83]	-	-.26 [-1.17, .65]	-

Note. Brackets represent 99% confidence intervals. Bolded values indicate significant effects whose confidence intervals did not contain zero. All effect sizes can be considered as percentages. Marital status effects are coded such that effect sizes represent the effects of getting married following marriage equality enactment. x = Indicates interaction. HILDA = Household, Income, and Labour Dynamics of Australia. UKHLS = United Kingdom Household Longitudinal Study. SM = Sexual minority status. SD RE = Random effects as standard deviations.

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Table S2-3

Anticipatory effects of marriage equality.

Term	HILDA		UKHLS	
	b [99% CI]	SD RE [99% CI]	b [99% CI]	SD RE [99% CI]
Intercept	79.58 [79.33, 79.82]	11.47 [11.29, 11.66]	69.86 [69.61, 70.11]	16.51 [16.29, 16.73]
SM	-3.40 [-4.34, -2.46]	-	-6.82 [-8.04, -5.59]	-
Pre-Vote	-.08 [-.10, -.05]	.83 [.81, .86]	-.21 [-.26, -.17]	1.16 [1.11, 1.21]
Pre-Vote x SM	-.10 [-.21, .01]	-	-.40 [-.62, -.17]	-
Year Voted	.11 [-.08, .31]	5.19 [4.92, 5.45]	-.21 [-.46, .05]	9.64 [9.27, 10.01]
Year Voted x SM	-.52 [-1.29, .25]	-	.97 [-.29, 2.22]	-
Post-Vote	.02 [-.02, .06]	1.12 [1.07, 1.16]	-.04 [-.08, -.00]	1.70 [1.65, 1.75]
Post-Vote x SM	-.11 [-.26, .04]	-	-.18 [-.36, .00]	-

Note. Brackets represent 99% confidence intervals. Bolded values indicate significant effects whose confidence intervals did not contain zero. x = Indicates interaction. HILDA = Household, Income, and Labour Dynamics of Australia. UKHLS = United Kingdom Household Longitudinal Study. SM = Sexual minority status. All effect sizes can be considered as percentages. SD RE = Random effects as standard deviations.

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