Does Sexual Orientation Influence Trajectories of Change in Health? A 20-Year Follow-Up Study

Christi L. Nelson, MA[1] and Ross Andel, PhD[1–3]

Abstract

Purpose: We examined the differences in physical health outcomes over a 20-year period between lesbian, gay, and bisexual (LGB) adults and heterosexual adults. We also examined whether the associations were moderated by social support and affect.

Methods: The analytical sample included 168 LGB adults and 336 1:2 propensity-matched heterosexual adults from the Midlife in the United States (MIDUS) study. Using negative binomial generalized estimating equations and mixed effect analyses, data from three waves of MIDUS, spanning from 1995 to 2014, were used to examine the associations between sexual orientation and the health outcomes (number of chronic conditions and functional limitations). Social support and affect were added to the models to test for moderation.

Results: LGB participants reported almost one more chronic condition at baseline and scored significantly higher for functional limitations. However, the number of chronic conditions for LGB participants increased less over time than compared to heterosexual participants, and there were no significant differences in terms of changes in functional limitation over time. Positive affect reduced the strength of the relationship between sexual orientation and functional limitations for LGB participants. No other moderating effects were significant.

Conclusion: The results of this study suggest that LGB individuals may become resilient to the negative health effects of minority stressors over time. Interventions should focus on improving the health of LGB individuals when they are younger and more at risk of negative health outcomes.

Keywords: affect, chronic conditions, LGB, longitudinal, sexual orientation, social support

Introduction

ONE OF THE objectives for Healthy People 2020 was to improve the health and well-being of lesbian, gay, bisexual, and transgender (LGBT) individuals.[1] However, very few studies have examined LGBT health over time. This lack of research exists despite the fact that 2.7 million older adults identify as LGBT in the United States, a number that is projected to double by 2060.[2] As a result, many questions remain regarding the relationship between sexual orientation and health over time as well as what factors influence this relationship.

The minority stress theory[3] posits that members of a socially stigmatized minority group, such as lesbian, gay, and bisexual (LGB) individuals, experience excess stress from additional stressors caused by discrimination and victimization, which negatively impacts their mental and physical health. As a result, LGB individuals are more likely to engage in health risk behaviors[4–6] that can increase the risk of developing chronic conditions. LGB adults were also more likely to report having poorer self-rated general health[5,6] and higher levels of functional limitations[4,7] or disability[5,6]; however, not much is known about how these health disparities between LGB and heterosexual adults change over time.

Social support relates to better health among LGB individuals.[5,8–10] However, it is not known whether social support from friends vs. family acts on health differently. LGB individuals often receive social support from friends in the absence of biological family; this is especially true for older LGBT adults who had to rely on friends due to the prevalence of discrimination and stigma in the past and have low or no social support from family.[11,12]

Positive affect (good mood or emotions) and negative affect (bad mood or emotions) may also play a role in the association between sexual orientation and health over

---

[1]School of Aging Studies, University of South Florida, Tampa, Florida, USA.
[2]International Clinical Research Center, St. Anne's University Hospital, Brno, Czech Republic.
[3]Department of Neurology, Charles University and Motol University Hospital, Prague, Czech Republic.

time, affecting functional limitations[13,14] and self-reported health.[14,15] However, no studies to our knowledge have investigated the role of positive or negative affect in the relationship between sexual orientation and change in health outcomes, which leaves an important gap in knowledge.

Current study

We examined differences in physical health outcomes over ~20 years between LGB and heterosexual individuals, using data from three waves of Midlife in the United States (MIDUS), a nationally representative, population-based study. In addition, we examined whether the relationship between sexual orientation and the physical health outcomes was moderated by social support, positive affect, and negative affect. Based on the minority stress theory[3] and previous research,[4–7] this study hypothesized that LGB middle-aged and older adults would (1) report more chronic conditions and functional limitations at baseline than heterosexual participants and (2) the number of chronic conditions and functional limitations reported would increase more for LGB participants over ~20 years. Finally, we expected that there would be moderating effects of baseline social support, positive affect, and negative affect on the relationship between sexual orientation and the two physical health outcomes.

Methods

Participants

The MIDUS study is a nationally representative, multidisciplinary study of middle-aged and older adults. This study used data from Wave 1 (1995–1996), Wave 2 (2004–2006), and Wave 3 (2013–2014) of the MIDUS study. The Wave 1 sample had a total of 7108 participants. Approximately 70% of participants from Wave 1 ($n = 4963$) continued to participate in the first follow-up (Wave 2) of the study. The second follow-up (Wave 3) consisted of 3294 participants; no new participants were recruited during these three waves. To be included in this study, participants had to have responded to the sexual orientation question during Wave 1 ($n = 6126$). At baseline, 94 participants identified as homosexual, 74 as bisexual, and 5958 as heterosexual. Homosexual and bisexual participants were combined into an LGB subgroup ($n = 168$). To reduce selection bias, two heterosexual participants were matched to each LGB participant using propensity score matching[16] (described in the analysis section). The final analytical sample ($n = 504$) for this study included 168 adults that self-identified as LGB and 336 matched heterosexual adults. This study was deemed exempt from review by the Institutional Review Board (IRB) at the University of South Florida as it was a retrospective study of existing publicly available, deidentified data. The original MIDUS study was approved by the IRB at the University of Wisconsin-Madison.

Measures

Dependent variables

Chronic conditions. For each wave, participants were asked a series of questions about whether they have various chronic conditions (e.g., stroke, high blood pressure, and diabetes). These conditions were then separately summed to create composite variables of the total number of chronic conditions reported by each participant with a maximum of 30 chronic conditions for each wave. The list of the 30 chronic conditions are found in Supplementary Data (Supplementary Appendix SA1).

Functional limitations. The nine items for functional limitations are from the Medical Outcomes Study (MOS) 36-item short-form health survey (SF-36).[17] The items asked how much the participant's health limited their ability to perform two basic activities of daily living (ADLs) and seven instrumental ADL (IADLs). ADLs included bathing/dressing and walking one block. IADLs included lifting/carrying groceries, climbing several flights of stairs, bending/kneeling/stooping, walking more than one mile, walking several blocks, moderate activities (e.g., vacuuming), and vigorous activities (e.g., running). Responses ranged from (1) a lot to (4) not at all. The items were reverse coded so higher values indicated more functional limitations. For each wave, the two scales were combined and averaged to have an overall functional limitation outcome variable with higher scores indicating more functional limitations. Due to averaging, this measure was treated as a continuous variable in analyses.

Level 2 predictor

Sexual orientation. Participants were asked whether they identified as homosexual, heterosexual, or bisexual. For this study, homosexual (lesbian/gay) and bisexual participants were combined into an LGB subgroup and were compared to a propensity matched heterosexual subgroup.

Positive affect and negative affect. Positive affect was measured with a six-item scale that asked participants how much of the time they felt cheerful, in good spirits, extremely happy, calm and peaceful, satisfied, and full of life, during the past 30 days. Negative affect was measured with a six-item scale that asked participants how much of the time they felt so sad nothing could cheer them up, nervous, restless, hopeless, that everything was an effort, and worthless, during the past 30 days. Responses ranged from (1) all of the time to (5) none of the time. For both positive and negative affect, composite variables were constructed that combined and averaged the six items for each variable. The values were recorded for each variable so higher scores indicated higher levels of positive and negative affect.

Social support. Participants were asked a series of questions about how much their friends and family support them. These questions included asking about whether friends/family really care about the participant, understand the way they feel, whether the participant can rely on them for help with problems, and whether the participant feels they can open up to them about their worries. Responses ranged from (1) a lot to (4) not at all. Separate composite variables were constructed for support from friends and support from family. Responses were reverse coded so higher values indicated higher levels of support.

Level 1 predictor

Time. Time was operationalized as the three time points (waves) in this study that spanned ~20 years: Wave 1 (1995–1996), Wave 2 (2004–2006), and Wave 3 (2013–2014) of the MIDUS study.

Covariates. Age (years), sex (male/female), education (high school vs. less than high school), and race (White/non-White) were covariates, as these variables can confound the association between sexual orientation and the outcome variables. All covariates included in this study were self-reported.

Statistical analyses. All statistical analyses for this study were performed using SAS, version 9.4 (SAS Institute Inc., Cary, NC). Propensity score matching[16] improves the accuracy of inferences made based on the results of the analyses and reduces bias on known covariates by matching heterosexual participants to LGB participants. To create the matched sample, propensity scores were estimated using a logistic regression with sexual orientation as the dependent variable, adjusted for the covariates (age, sex, education, and race). Using the greedy propensity score matching add-on in SAS,[16] two heterosexual participants were matched to each of the LGB participants based on the estimated propensity score. Greedy matching makes the best matches first based on eight digits of the propensity score. When a match cannot be made using eight digits, the algorithm attempts to match based on seven digits of the propensity score. This continues until no matches can be made based on one digit of the propensity score. To confirm the balance between the two groups, chi-square and *t*-tests were conducted. Chi-square and *t*-tests were also used to examine the differences between dropouts after the first wave and participants with data from other waves.

The PROC GENMOD procedure in SAS was used to analyze the association between sexual orientation and chronic conditions over ~20 years. To account for the large number of responses of zero chronic conditions (24% of participants in Wave 1, 27% in Wave 2, and 17% in Wave 3), we used generalized estimating equation (GEE) analyses with zero-inflated negative binomial distribution. GEE analyses are robust against violations of normality that often occur with count variables that are usually skewed due to the large number of responses at the lower end. GEE analyses also can use all available longitudinal data rather than excluding cases with missing data, if the data are missing at random. To examine the association between sexual orientation and functional limitations over time, we assessed the functional limitation measure as a continuous dependent variable with mixed effect models, using the PROC MIXED procedure in SAS.

The potential moderating effects of positive affect, negative affect, and social support (family and friend) on the association between sexual orientation and the health outcome measures were assessed by stratifying each moderator above and below its median and including the product of the moderator and the independent variable in the models. Because of the unique matched sample, survey weights were not applied to the data.

Results

Dropouts after the first wave ($n = 168$) were more likely to be non-White than those with at least two waves of data ($n = 333$) (89% vs. 95%, $p = 0.04$); there were no significant differences in age ($p = 0.35$), sex ($p = 0.20$), or education ($p = 0.12$). After matching, the heterosexual group ($n = 336$) was the same age on average as the LGB group ($p = 0.99$), had approximately the same percentage of participants that had some college education or more ($p = 0.89$), and was also more balanced in sex ($p = 0.29$) and race ($p = 0.53$). On average, LGB participants had significantly higher baseline functional limitation scores ($p < 0.01$) and more chronic conditions ($p < 0.001$) than the matched heterosexual group. LGB participants scored significantly higher in baseline negative affect ($p < 0.001$) and significantly lower in positive affect ($p < 0.01$) and social support from family ($p < 0.001$); there was no significant difference in baseline social support from friends ($p = 0.13$). Table 1 displays all baseline comparisons of the LGB and heterosexual participants before and after propensity score matching.

Table 2 displays the results of the GEE analysis using the propensity-matched sample for the association between sexual orientation and number of chronic conditions. The results revealed a higher number of chronic conditions among LGB compared to heterosexual participants at baseline ($b = 0.39$, standard error [SE] = 0.09, $p < 0.001$). The calculated odds

TABLE 1. COMPARISONS OF LESBIAN, GAY, AND BISEXUAL PARTICIPANTS AND HETEROSEXUAL PARTICIPANTS AT WAVE 1 BEFORE AND AFTER PROPENSITY-SCORE MATCHING

Variables	LGB participants (n = 168)	All heterosexual participants (n = 5958)	p	Propensity-matched heterosexual participants (n = 336)	p
Age, M (SD)	42.83 (12.52)	46.84 (12.88)	<0.001	42.83 (12.50)	0.99
Sex (% male)	54%	48%	0.10	49%	0.29
Education (% some college or more)	67%	63%	0.44	67%	0.89
Race (% White)	94%	91%	0.12	92%	0.53
Positive Affect, M (SD)	3.22 (.81)	3.39 (.72)	<0.01	3.34 (.68)	<0.01
Negative Affect, M (SD)	1.85 (.88)	1.53 (.61)	<0.001	1.53 (.59)	<0.001
Social Support from Family, M (SD)	3.16 (.78)	3.44 (.61)	<0.001	3.43 (.59)	<0.001
Social Support from Friends, M (SD)	3.30 (.70)	3.23 (.66)	0.22	3.20 (.71)	0.13
Number of chronic conditions, M (SD)	3.12 (2.94)	2.37 (2.47)	<0.001	2.31 (2.35)	<0.001
Functional Limitations, M (SD)	1.47 (.75)	1.35 (.58)	<0.01	1.35 (.58)	<0.01

LGB, lesbian, gay, and bisexual; M, mean; SD, standard deviation.

TABLE 2. RESULTS OF GENERALIZED ESTIMATING
EQUATION ANALYSIS OF THE ASSOCIATION BETWEEN
SEXUAL ORIENTATION AND NUMBER OF CHRONIC
CONDITIONS OVER APPROXIMATELY 20 YEARS

Parameter	b (SE)	p	OR (95% CI)
Intercept	0.69 (0.06)	<0.001	2.00 (1.78–2.24)
Time	0.20 (0.04)	<0.001	1.22 (1.14–1.31)
LGB	0.39 (0.09)	<0.001	1.48 (1.24–1.76)
Time*LGB	−0.12 (0.06)	0.06	0.89 (0.78–1.00)

The beta coefficient (b) values were calculated from the logs of
the expected count as a linear function of sexual orientation.
CI, confidence interval; OR, odds ratio; SE, standard error.

ratio [OR] indicated that LGB individuals were 48% more
likely to have an extra chronic condition at baseline
(OR = 1.48, 95% confidence interval [CI] = 1.24–1.76).

There was an increase in the number of chronic conditions
over time ($b = 0.20$, SE = 0.04, $p < 0.001$), indicating a 22%
increase in the odds of having an extra chronic condition
after 10 years (OR = 1.22, 95% CI = 1.14–1.31). The interac-
tion effect of time*LGB indicated that the number of chronic
conditions for LGB individuals increased less over time com-
pared to heterosexual adults, but the effect only approached
statistical significance ($b = -0.12$, SE = 0.06, $p = 0.06$).
Figure 1 illustrates the differences in the number of chronic
conditions between the two groups over time in a line graph.

Table 3 summarizes the results of the mixed effects model
using the propensity-matched sample for the association be-
tween sexual orientation and functional limitations over
time. The average baseline functional limitation score for
LGB participants was significantly higher than the score
for heterosexual participants ($b = 0.12$, SE = 0.06, $p < 0.05$).
There was also a significant effect of time, indicating that
the increase in functional limitation scores over time for het-
erosexual participants was significant ($b = 0.18$, SE = 0.03,
$p < 0.001$). There was no significant effect of time*LGB, in-
dicating that, compared to heterosexual participants, LGB
participants did not differ significantly in the change in func-
tional limitation scores over time.

Moderation analyses

Table 4 summarizes the results of the stratified GEE
analyses for each moderator and the p values for the
time*moderator*LGB interactions, indicating whether
the moderating effects were significant. Figure 2 depicts the
moderated associations between sexual orientation and the
number of chronic conditions over time. Although being
high or low in the moderators did change the baseline number
of chronic conditions and the trajectory over time for LGB
and heterosexual participants, only social support from
friends significantly moderated the association ($p = 0.0455$);
no other moderating interaction terms were significant.
Finally, for the association between sexual orientation and
functional limitations, there was a significant moderating
effect of positive affect ($p < 0.01$). Figure 3 shows the asso-
ciation between sexual orientation and functional limitations
over time (a) and the moderating effect of positive affect (b).
No other moderator affected the association and will not be
discussed further.

The results were obtained from a sample matched for the
propensity to be LGB. Although comparisons in Table 1 pro-
vide evidence that the matching was successful, we ran addi-
tional analyses controlling for the same covariates that were
included in the matching procedure. The results of these an-
alyses did not change substantially after further controlling
for the covariates and, therefore, are not reported.

Discussion

We sought to examine differences in physical health out-
comes between LGB and heterosexual individuals, as well
as potential moderation of these differences by social sup-
port, positive affect, and negative affect, over ~20 years.
We found that LGB participants reported almost one more
chronic condition at baseline than did heterosexual partici-
pants. However, over time, the number of chronic conditions
increased less rapidly for the LGB participants compared to
the heterosexual participants (Fig. 1). Furthermore, LGB
participants had significantly higher functional limitation

FIG. 1. The number of
chronic conditions over three
waves of the MIDUS study,
~20 years. The figure mod-
els the results of the negative
binomial GEE analysis for
the association between sex-
ual orientation and number of
chronic conditions. The val-
ues for numbers of chronic
conditions are the logs of the
expected count as a linear
function of sexual orienta-
tion. GEE, generalized esti-
mating equation; LGB,
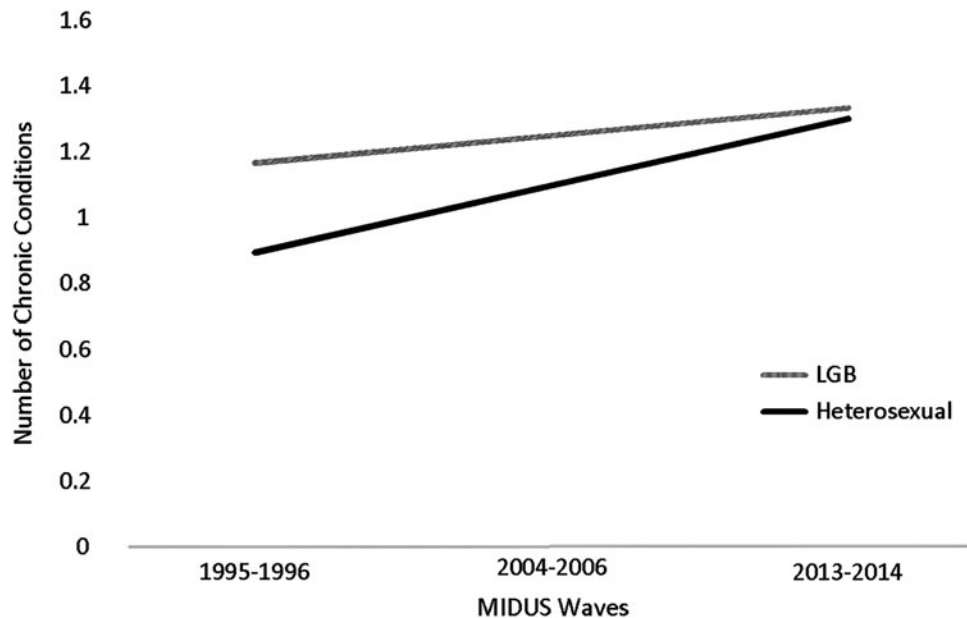lesbian, gay, and bisexual;
MIDUS, Midlife in the
United States.

TABLE 3. RESULTS OF MIXED EFFECTS ANALYSIS OF THE ASSOCIATION BETWEEN SEXUAL ORIENTATION AND FUNCTIONAL LIMITATIONS OVER APPROXIMATELY 20 YEARS

Parameter	b (SE)	p
Intercept	1.35 (0.04)	<0.001
Time	0.18 (0.03)	<0.001
LGB	0.12 (0.06)	0.047
Time*LGB	−0.01 (0.05)	0.79

scores on average compared to heterosexual participants. Longitudinally, our results indicated no significant differences in the change of functional limitation scores over the 20-year span between LGB and heterosexual individuals. These results corroborate previous findings of poorer health outcomes for LGB individuals[4–6,18] and may indicate that LGB individuals become more resilient to the negative effects of minority stress over time.

Previous studies have found similar evidence of health disparities between LGB and heterosexual adults; however, no study to our knowledge has examined these health disparities over time. Although cross-sectional studies have found that LGB individuals are more likely to report poorer physical health and more functional limitations,[4,9,19] our longitudinal findings suggest that there may be a threshold where LGB health starts to reverse course relative to heterosexual adults, showing a slower rate of decline with age. In fact, the number of chronic conditions almost converged when viewed over time (Fig. 1). This may suggest that LGB individuals become more resilient to the negative health effects of minority stress over time. Findings from previous studies have found evidence of possible resilience in LGB adults.[6,9,20] Further research is needed to corroborate this notion, including the possible underlying mechanisms such as resilience.

Moderation results

Comparing the graphs in Figure 2 to the graph in Figure 1 shows that the moderators did affect the baseline number of chronic conditions and the overall trajectory for LGB and heterosexual participants over the 20-year span; however, only social support from friends significantly moderated the association. Contrary to previous findings, LGB individuals seemed to be affected negatively by having higher social support from friends in terms of the change in the number of chronic conditions. It may be that LGB individuals with low social support from friends may have to rely on themselves more over time, increasing their resilience to the negative health effects of minority stressors. These results contradict previous research that found that higher social support *in general* resulted in better health outcomes.[5,8,9] However, these studies did not differentiate between social support from friends versus from family and did not include analysis of change.

Only positive affect significantly moderated the association between sexual orientation and functional limitations. Namely, LGB individuals with lower positive affect appeared to have slightly higher functional limitation scores at baseline and their scores increased over time. In contrast, LGB individuals with higher positive affect had lower

TABLE 4. RESULTS OF MODERATED GENERALIZED ESTIMATING EQUATION ANALYSES OF THE ASSOCIATION BETWEEN SEXUAL ORIENTATION AND NUMBER OF CHRONIC CONDITIONS OVER APPROXIMATELY 20 YEARS

Parameter	Social support from family		Social support from friends		Positive affect		Negative affect	
	Low	High	Low	High	Low	High	Low	High
	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)
Intercept	0.74 (0.07)***	0.65 (0.09)***	0.74 (0.08)***	0.63 (0.08)***	0.84 (0.07)***	0.52 (0.09)***	0.36 (0.10)***	0.88 (0.07)***
Time	0.21 (0.05)***	0.20 (0.05)***	0.25 (0.05)***	0.13 (0.06)*	0.16 (0.05)**	0.26 (0.05)***	0.29 (0.05)***	0.16 (0.05)***
LGB	0.45 (0.11)***	0.22 (0.16)	0.47 (0.13)***	0.35 (0.12)**	0.44 (0.10)***	0.14 (0.17)	0.20 (0.17)	0.36 (0.10)***
Time*LGB	−0.12 (0.08)	−0.12 (0.10)	−0.27 (0.10)**	0.03 (0.09)	−0.12 (0.08)	−0.04 (0.11)	−0.01 (0.10)	−0.13 (0.08)
Three-way interaction p value	0.14		0.045		0.81		0.37	

b, beta coefficient.

The moderators were split above and below their respective medians. The medians for family social support and positive affect were 3.5. The median for friend social support was 3.25, and the median for negative affect was 1.33. Values greater than the median are referred to as high and values less than or equal to the median are referred to as low.
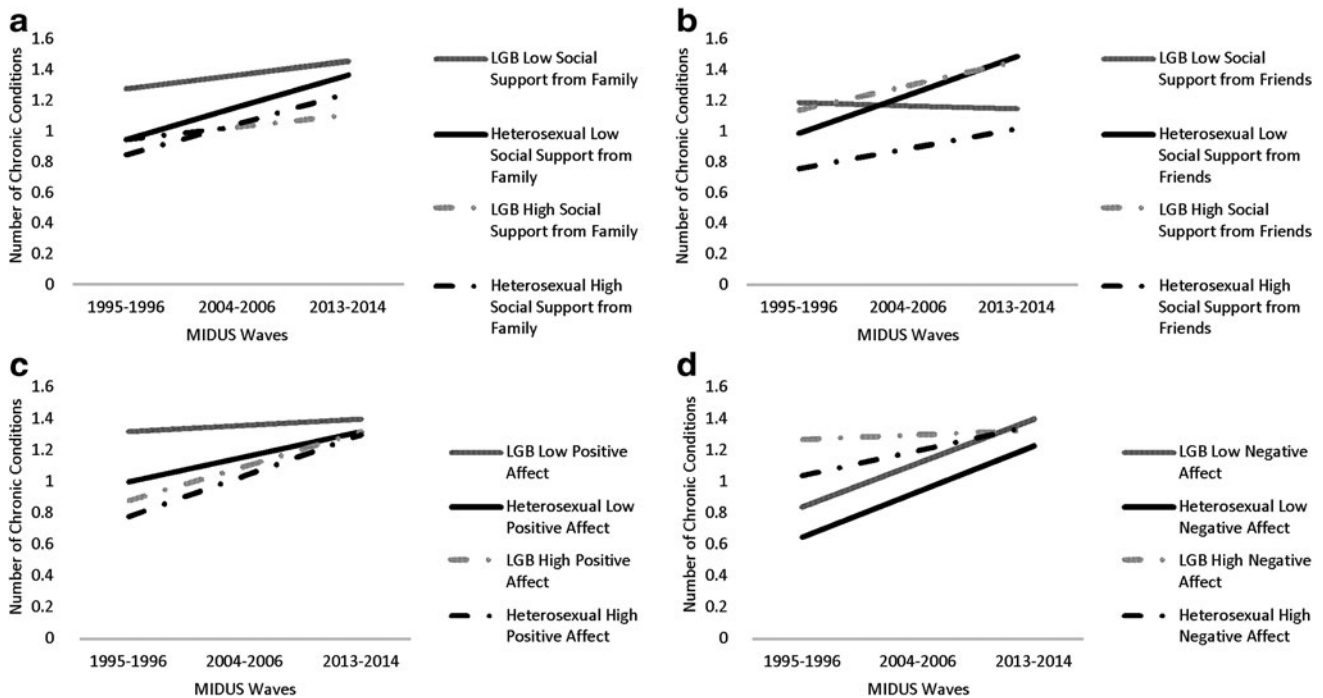
*p<0.05; **p<0.01; ***p<0.001.

FIG. 2. Moderated GEE analyses showing the moderated associations between sexual orientation and number of chronic conditions over three waves of the MIDUS study, an ~20-year span. The moderating variables include **(a)** family social support, **(b)** friend social support, **(c)** positive affect, and **(d)** negative affect. For each moderator, values greater than the median are referred to as high and values less than or equal to the median are referred to as low. The values for numbers of chronic conditions are the logs of the expected count as a linear function of sexual orientation.

functional limitations at baseline and their functional limitation scores decreased over time. It is possible that LGB individuals become more resilient over time due to their experiences with minority stressors and show slower progression of functional limitations with age. Previous research has found that baseline positive affect was predictive of future functional limitations.[13,14] However, positive affect did not moderate the relationship between sexual orientation

and the number of chronic conditions over time, indicating that this moderating effect may not persist over time.

Strengths and limitations

First, this is one of the first longitudinal analyses of LGB older adults' health disparities. No previous studies to our knowledge have examined differences in physical health
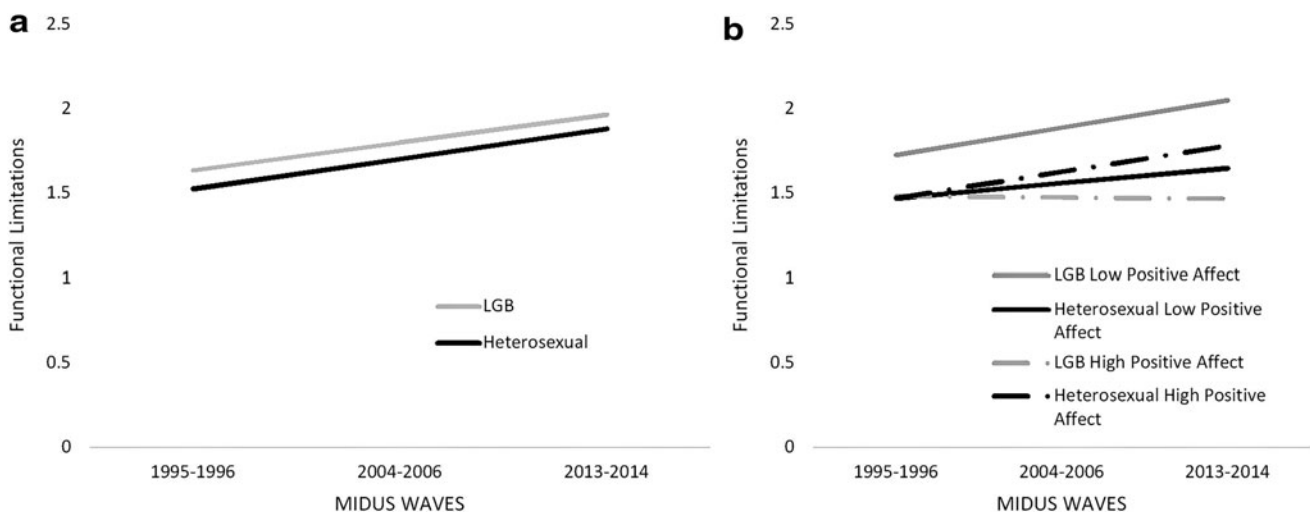

FIG. 3. The figure on the left **(a)** displays the association between sexual orientation and functional limitation scores over three waves of the MIDUS study, an ~20-year span. The figure on the right **(b)** displays the significant moderating effect of positive affect ($p < 0.01$). High positive affect is categorized as being above the median value (3.5), and low positive affect includes values at or below the median.

over time between LGB and heterosexual adults. Second, we used propensity score matching, which improves the accuracy of inferences based on observational data. Using only heterosexual participants who matched the LGB participants in terms of the propensity to be in the latter group helps control for measured and unmeasured confounds, which could contribute to differences in health. Finally, this study used a nationally representative population-based sample.

Among study limitations, there were missing data and attrition (one-third of the sample participated in the first wave only), which are common in longitudinal studies. Fortunately, with GEE and mixed effects modeling, all observations can be used in the analyses as long as the data are missing at random, which was assumed in this study. Our study used self-reported measures, which may result in biases that could affect the results. Furthermore, we used baseline social support and affect as moderators and did not examine the moderating effects of changes in these variables over time. However, previous examination of positive and negative affect in MIDUS found only minor, nonsignificant changes in affect within individuals over the 20-year span, indicating that positive and negative affect scores remain relatively stable over time.[21] We found the same results for our sample and also found that social support was not significantly different over time. This study only used baseline sexual orientation data, even though longitudinal data are available. This was because we were interested in associating baseline characteristics with change over time. In addition, only about 2% of participants reported a different sexual orientation at a subsequent wave,[22] which is too small a sample for any statistical analysis, but the few cases reporting change in sexual orientation later are also extremely unlikely to have any impact on our results. Finally, we were unable to assess differences by subgroup as there were only 53 gay men, 38 bisexual men, 41 lesbian women, and 36 bisexual women. We were also unable to include transgender individuals in our analyses due to gender identity data not being available in MIDUS. Previous research[4,6,18] has found differences in health disparities by subgroup and by gender, indicating that this is an important question that needs further investigation in future research.

Conclusions

As our results suggest that LGB individuals may have worse health when they are younger but may become more resilient as they age, increasing knowledge of this possibility and promoting good mental health early on may provide the best outcomes in older adulthood. Future research should continue to examine LGB individuals longitudinally to assess the trajectory of their health disparities and consider variability in resilience by sexual orientation as a feasible explanatory factor.

Disclaimer

Primary data collection was conducted by the MacArthur Foundation Research Network on Successful Midlife Development. No part of this article has been presented previously.

Author Disclosure Statement

No competing financial interests exist.

Supplementary Material

Supplementary Appendix SA1

References

1. U.S. Department of Health and Human Services. 2020 Topics & Objectives: Lesbian, gay, bisexual, and transgender health. 2013. Available at https://www.healthypeople.gov/2020/topics-objectives/topic/lesbian-gay-bisexual-and-transgender-health/objectives Accessed July 12, 2019.
2. Fredriksen-Goldsen KI, Kim HJ: The science of conducting research with LGBT older adults-an introduction to Aging with Pride: National Health, Aging, and Sexuality/Gender Study (NHAS). Gerontologist 2017;57:S1–S14.
3. Meyer IH: Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. Psychol Bull 2003;129:674–697.
4. Blosnich JR, Farmer GW, Lee JGL, et al.: Health inequalities among sexual minority adults: Evidence from ten US states, 2010. Am J Prev Med 2014;47:337–349.
5. Fredriksen-Goldsen KI, Emlet CA, Kim HJ, et al.: The physical and mental health of lesbian, gay male, and bisexual (LGB) older adults: The role of key health indicators and risk and protective factors. Gerontologist 2013;53:664–675.
6. Fredriksen-Goldsen KI, Kim HJ, Shui C, Bryan AEB: Chronic health conditions and key health indicators among lesbian, gay, and bisexual older US adults, 2013–2014. Am J Public Health 2017;107:1332–1338.
7. Seelman KL: Differences in mental, cognitive, and functional health by sexual orientation among older women: Analysis of the 2015 Behavioral Risk Factor Surveillance System. Gerontologist 2019;59:749–759.
8. Emlet CA, Fredriksen-Goldsen KI, Kim HJ: Risk and protective factors associated with health-related quality of life among older gay and bisexual men living with HIV disease. Gerontologist 2013;53:963–972.
9. Fredriksen-Goldsen KI, Kim HJ, Bryan AEB, et al.: The cascading effects of marginalization and pathways of resilience in attaining good health among LGBT older adults. Gerontologist 2017;57:S72–S83.
10. Fredriksen-Goldsen KI, Kim HJ, Shiu C, et al.: Successful aging among LGBT older adults: Physical and mental health-related quality of life by age group. Gerontologist 2015;55:154–168.
11. Anderson JG, Flatt JD: Characteristics of LGBT caregivers of older adults: Results from the national Caregiving in the U.S. 2015 survey. J Gay Lesbian Soc Serv 2018;30:103–116.
12. Muraco A, Fredriksen-Goldsen K: ''That's what friends do'': Informal caregiving for chronically ill midlife and older lesbian, gay, and bisexual adults. J Soc Pers Relat 2011;28:1073–1092.
13. Brummett BH, Babyak MA, Grønbaek M, Barefoot JC: Positive emotion is associated with 6-year change in functional status in individuals aged 60 and older. J Posit Psychol 2011;6:216–223.
14. Wiese CW, Chen ZJ, Tay L, et al.: The role of affect on physical health over time: A cross-lagged panel analysis over 20 years. Appl Psychol Health Well Being 2019;11:202–222.
15. Hoy-Ellis CP, Fredriksen-Goldsen KI: Lesbian, gay, & bisexual older adults: Linking internal minority stressors,

chronic health conditions, and depression. Aging Ment Health 2016;20:1119–1130.

16. Parsons LS: Performing a 1: N case-control match on propensity score. Proceedings of the 29th Annual SAS Users Group International Conference, Montreal, Canada, 2004.

17. Ware JE Jr, Sherbourne CD: The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Med Care 1992;30:473–483.

18. Fredriksen-Goldsen KI, Kim HJ, Barkan SE: Disability among lesbian, gay, and bisexual adults: Disparities in prevalence and risk. Am J Public Health 2012;102:e16–e21.

19. Fredriksen-Goldsen KI, Kim HJ, Barkan SE, et al.: Health disparities among lesbian, gay, and bisexual older adults: Results from a population-based study. Am J Public Health 2013;103:1802–1809.

20. Nelson CL, Andel R: Does sexual orientation relate to health and well-being? Analysis of adults 50+ years of age. Gerontologist 2020;gnz187 [Epub ahead of print]; DOI: 10.1093/geront/gnz187.

21. Chan MH, Gerhardt M, Feng X: Measurement invariance across age groups and over 20 years' time of the Negative and Positive Affect Scale (NAPAS). Eur J Psychol Assess 2019;1–7. DOI: 10.1027/1015-5759/a000529.

22. Mock SE, Eibach RP: Stability and change in sexual orientation identity over a 10-year period in adulthood. Arch Sex Behav 2012;41:641–648.

Address correspondence to:
Christi L. Nelson, MA
School of Aging Studies
University of South Florida
13301 Bruce B. Downs Boulevard, MHC 1300
Tampa, FL 33612-3807
USA

E-mail: cnelson13@usf.edu