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Research Article

Same-Sex Couples and Cognitive Impairment: Evidence From the Health and Retirement Study

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Abstract

Objectives: We provide the first nationally representative population-based study of cognitive disparities among same-sex and different-sex couples in the United States.

Methods: We analyzed data from the Health and Retirement Study (2000–2016). The sample included 23,669 respondents (196 same-sex partners and 23,473 different-sex partners) aged 50 and older who contributed to 85,117 person-period records (496 from same-sex partners and 84,621 from different-sex partners). Cognitive impairment was assessed using the modified version of the Telephone Interview for Cognitive Status. Mixed-effects discrete-time hazard regression models were estimated to predict the odds of cognitive impairment.

Results: The estimated odds of cognitive impairment were 78% ($p < .01$) higher for same-sex partners than for different-sex partners. This disparity was mainly explained by differences in marital status and, to a much lesser extent, by differences in physical and mental health. Specifically, a significantly higher proportion of same-sex partners than different-sex partners were cohabiting rather than legally married (72.98% vs. 5.42% in the study sample), and cohabitors had a significantly higher risk of cognitive impairment than their married counterparts (odds ratio = 1.53, $p < .001$).

Discussion: The findings indicate that designing and implementing public policies and programs that work to eliminate societal homophobia, especially among older adults, is a critical step in reducing the elevated risk of cognitive impairment among older same-sex couples.

Keywords: Cognitive impairment, Gender, Marital status, Same-sex couples, Sexual minorities

With the rapid aging of the U.S. population, dementia and cognitive impairment have emerged as serious and growing public health concerns. Dementia is a stage of severe cognitive impairment that is associated with disability, an increased need for medical and personal care, and premature death (Alzheimer's Association, 2019). In 2019, about 5.8 million Americans were living with Alzheimer's disease and related dementias, and the annual estimated cost of dementia care was $290 billion (Alzheimer's Association, 2019). Recently, researchers have focused on identifying vulnerable subpopulations in order to design effective intervention strategies for reducing the risk of cognitive impairment and dementia. A growing number of studies have shown that relative to different-sex couples, same-sex couples experience major disadvantages in a number of health outcomes including self-rated health, depression, and chronic conditions (Fredriksen-Goldsen et al., 2013; Liu et al., 2013). However, there is little research

on whether sexual minority health disparities extend to cognitive health in late life and whether same-sex couples experience elevated, similar, or reduced risk of cognitive impairment than different-sex couples at older ages.

Using data from the Health and Retirement Study (HRS) 2000–2016, we conduct the first population-based study of cognitive status differences between same-sex and different-sex older couples in the United States. We address 3 major research questions: (a) Does the risk of cognitive impairment differs between same-sex and different-sex older couples? (b) Does marital status (married vs. cohabiting) and health-related factors (i.e., health behaviors, mental health, and physical health) contribute to the difference in the risk of cognitive impairment between same-sex and different-sex couples? and (c) Do these patterns differ by sex? The rapidly growing number of same-sex couple households in the United States highlights the importance of this study (Gates, 2015). According to the 2019 Current Population Survey, more than 1 million same-sex married and unmarried couples are currently living together in the United States (U.S. Census Bureau, 2019). Furthermore, older same-sex couples are an understudied disadvantaged group. *Healthy People* 2030 listed the achievement of health equity including the elimination of sexual minority health disparities as one of the program's major goals. The findings of the current study will help health policy makers and practitioners identify the most vulnerable subpopulations, thus facilitating the design of effective intervention strategies to reduce the risk of cognitive impairment and eliminate sexual minority health disparities.

Background

Hundreds of empirical studies have demonstrated that married people have better health, both mental and physical, than unmarried people including cohabiting, divorced, widowed, and never married people (Carr & Springer, 2010; Waite & Gallagher, 2000). A majority of the extant studies on marriage and health focus on heterosexual cisgender couples; researchers have paid less attention to heterogeneity among couples, especially differences in the sex composition of couples (Hsieh & Liu, 2019). With a growing number of U.S. states legalizing same-sex marriage in the past decade, as well as the nationwide legalization of same-sex marriage in 2015, an emerging body of studies have compared health differences between same-sex and different-sex couples. For example, using data from the National Health Interview Survey, researchers determined that same-sex cohabiting adults reported poorer self-rated health (Liu et al., 2013) and a higher rate of smoking (Reczek et al., 2014) than different-sex married adults, while same-sex cohabitors experienced somewhat better health outcomes than different-sex cohabitors and singles, mostly due to the former group's relatively higher socioeconomic status (Liu et al., 2013).

Studies on sexual minority disparities in cognitive health are rare and have produced mixed evidence (Correro & Nielson, 2020). A recent study based on a mix of clinical and community samples showed that same-sex partners had similar risks of mild cognitive impairment and dementia as different-sex partners (Perales-Puchalt et al., 2019). A few other population-based studies have compared the cognitive health of self-identified sexual minorities and heterosexual-identified individuals without considering the sex of the spouse. Seelman (2019) showed that among older women, bisexual women reported more difficulty remembering, concentrating, or making decisions than heterosexual women, but there was no difference between lesbian and heterosexual women. Nelson and Andel (2020) compared self-rated memory among lesbian, gay, and bisexual (LGB) and heterosexual older adults and found no significant difference. Another population-based study also found no significant difference in subjective cognitive decline between sexual minorities and their heterosexual counterparts (Brown & Patterson, 2020). However, to the best of our knowledge, no population-based studies have examined whether same-sex and different-sex couples have similar or different risks of cognitive impairment at older ages.

A Minority Stress Perspective

The minority stress perspective provides a framework for understanding why same-sex couples may have worse health, including cognitive health, than different-sex couples (Correro & Nielson, 2020; Meyer, 2003). Same-sex couples report experiencing higher levels of victimization, discrimination, and maltreatment than different-sex couples. These experiences, which have been recognized as major health risk factors (Hatzenbuehler, 2009; Meyer, 2003), likely increase the risk of cognitive impairment by causing the sympathetic nervous system to induce the release of stress hormones (e.g., catecholamines, cortisol) which trigger physiological responses and damage brain cells and impair memory and other cognitive functions (Henckens et al., 2009; Kuhlmann et al., 2005; Oei et al., 2007). Moreover, the stressors experienced by members of sexual minority groups may cause detrimental neurobiological changes and emotional and behavioral problems, such as feeling depressed, smoking, and drinking (Austin et al., 2009; Burgard et al., 2005; Hatzenbuehler, 2009). These emotional and behavioral problems, in turn, may be detrimental to cognitive function. Guided by the minority stress perspective, we hypothesize that:

> *Hypothesis 1: Same-sex partners have a higher risk of cognitive impairment than different-sex partners in late life.*

The Role of Marital Status

One of the most frequently documented sexual minority stressors is the historical restriction of same-sex couples' access to legal marriage. In the United States, same-sex marriage was not legalized at the national level until 2015, although several U.S. states opened legal access to same-sex unions and marriages during the 1990s and 2000s. Therefore, a large number of same-sex couples, especially older couples, lived together without being legally married. Legal barriers differentiated the process of self-selection into marriage for older different-sex and same-sex couples. Among different-sex couples, those with higher SES and other health-favorable characteristics were more likely to marry than cohabit (Musick et al., 2012), but for most same-sex couples, self-selection into marriage was not an option until 2015. Even after the nationwide legalization of same-sex marriage, some same-sex couples who hold a critical view of the marriage institution, such as seeing marriage as reinforcing heteronormative lifestyles, remain in cohabiting relationships (Goldberg & Kuvalanka, 2012; Reczek et al., 2009). Accordingly, the health effects of marriage selection may be weaker in same-sex relationships in comparison to different-sex relationships.

Although some scholars have argued that cohabitation and marriage are relatively similar among older people (Brown et al., 2012), a recent analysis of data from the HRS found that older cohabiting people have higher risks of developing dementia than their married counterparts (Liu et al., 2020). This marital advantage, primarily documented in heterosexual marriages, is due to both the protective resources (economic and psychosocial) that people gain from this privileged institution (Waite & Gallagher, 2000) and the selection of people with greater access to resources into marriage (Musick et al., 2012). Cohabitors who share living space with a partner may, to some degree, also benefit from economies of scale in ways similar to married people, yet cohabitors are less likely than married individuals to pool their income or have partners specialize in household labor/paid work, which may inhibit the potential economic returns of living together (Waite & Gallagher, 2000). Moreover, cohabitors may not receive the same level of sociopsychological benefits as married people because cohabiting entails a lower level of commitment and has less institutional legitimacy (Waite & Gallagher, 2000). For example, cohabitors are less likely than married people to receive support from friends or relatives (Eggebeen, 2005). Cohabitors are also more likely than married people to report relationship strain and experience union dissolution (Brown, 2000). These differing economic and sociopsychological pathways may lead to disparities in cognitive health. Given that same-sex couples are less likely than different-sex couples to be married and that being married is associated with health advantages, we hypothesize that:

Hypothesis 2: The difference in the risk of cognitive impairment between same-sex and different-sex partners is due at least partly to a difference in marital status.

The Role of Health-Related Factors

Elevated levels of minority stress exposure can cause changes in health behaviors (e.g., increased smoking and drinking) and deregulation of psychological and physiological systems, which may lead to mental and physical illnesses such as depression and cardiovascular diseases and in turn increase the risk of cognitive impairment (Conron et al., 2010; Flatt et al., 2018). A number of studies have documented that same-sex couples are more likely to engage in unhealthy behaviors (e.g., smoking, excessive drinking) and experience mental (e.g., depressive symptoms) and physical (e.g., cardiovascular diseases) health conditions than their heterosexual counterparts (Fredriksen-Goldsen et al., 2013; Gonzales et al., 2016; Liu et al., 2016).

These health-related factors are all risk factors for cognitive impairment. For example, smoking provokes white blood cells in the central nervous system to attack healthy cells, leading to severe neurological damage and impaired cognitive function (Anstey et al., 2007; Ghosh et al., 2009; Peters et al., 2008; Tyas et al., 2003; Zhou et al., 2014). Heavy drinking may damage the brain's white matter and increase the risk of both adverse brain outcomes and steeper cognitive decline (Hayes et al., 2016; Ridley et al., 2013; Zhou et al., 2014). Depression can damage brain cells and impair memory and other cognitive functions (Byers & Yaffe, 2011). Chronic conditions such as cardiovascular diseases and diabetes are also shown to be strong predictors for cognitive impairment and dementia (Justin et al., 2013; Strachan et al., 2008). Because same-sex couples are more likely than different-sex couples to experience these health issues (Fredriksen-Goldsen et al., 2013; Gonzales et al., 2016; Liu et al., 2016), these health-related factors may help explain the elevated risk of cognitive impairment for same-sex couples in late life.

Hypothesis 3: The difference in the risk of cognitive impairment between same-sex and different-sex partners is due at least partly to health-related factors including health behaviors and mental and physical health conditions.

Gender Differences

A substantial literature has found that there are significant differences between gay couples and lesbian couples (Kolk & Andersson, 2020; Umberson et al., 2018). For example, lesbian women tend to have higher partnership or marriage rates than gay men (also see different evidence from Kolk & Andersson, 2020) and thus may accrue more health benefits from their relationships (Umberson et al.,

2018). Moreover, previous research, primarily based on data from different-sex couples, has suggested that the marital advantage in health is greater for men than for women (Carr & Springer, 2010; Simon, 2002). This greater advantage among men occurs mainly because men in different-sex marriages receive more psychosocial health-promoting benefits from marriage than women in such marriages: wives tend to maintain social networks, provide emotional support, and regulate health behaviors—all factors that promote husbands' health—while husbands provide fewer such resources to their wives (Simon, 2002; Umberson et al., 2018). The conventional gendered norms found in different-sex marriages suggest that gay partners obtain relatively fewer psychosocial resources from their male partners than lesbian partners do from their female partners (Umberson et al., 2018), and thus gay couples likely experience a greater disadvantage in cognitive impairment than lesbian couples. However, researchers have also contended that relative to their heterosexual counterparts, sexual minorities are less likely to follow traditional gender expectations and more likely to take equal responsibility for economic, emotional, and health care work in intimate relationships (Hsieh & Liu, 2019; Umberson et al., 2018). For example, same-sex partners, on average, engage in more cooperative health care work, such as taking turns scheduling medical checkups and promoting a healthy diet, than different-sex partners (Umberson et al., 2018). Thus, gender differences in the link between marital status and health may exist among different-sex couples but not among same-sex couples (Hsieh & Liu, 2019).

On the other hand, women face more structural constraints to accessing health-promoting resources (e.g., health care) than men (Bird & Rieker, 2008). Lesbian women may suffer the "double jeopardy" that results from being a sexual minority and being a woman and thus experience greater stress and more disadvantages than gay men. This scenario may produce greater cognitive health disparities between lesbian couples and their different-sex counterparts than between gay couples and their different-sex counterparts. Given the mixed evidence for potential gender differences in the link between same-sex marital status and cognitive health, we conduct an exploratory analysis (rather than a hypothesis-driven analysis) of gender differences.

Data and Methods

Data

We used data from the HRS (2000–2016), which is conducted by the Institute for Social Research at the University of Michigan. The HRS surveys a national sample of noninstitutionalized adults older than age 50 and their spouses (Servais, 2010). The survey oversamples Blacks and Hispanics and collects detailed information on cognitive, physical, economic, work, and family conditions, as well as health behaviors, approximately every 2 years (by telephone or in person). The HRS has high response rates (81%–89%) in each wave and provides a unique opportunity to address the current research question because of its large sample size, long-term follow-up, and high-quality measures of cognitive health and other key variables.

Given our focus on same-sex and different-sex couples, the analytic sample was restricted to married or cohabiting community residents older than age 50. About 6% of the interviews in the focal sample were conducted through proxies (spouses or children) for those who could not participate in the survey due to health issues or death (Langa et al., 2009). In the analysis, we included both self-reports and proxy reports to avoid underestimating dementia cases. Missing data on cognitive measures and other key variables (less than 1% of the total sample) were excluded. Relative to the respondents included in the analysis, those who were excluded were more likely to be cognitively impaired, cohabiting, and non-White and to have less education ($p < .05$). The final sample included 23,669 respondents (196 same-sex partners and 23,473 different-sex partners) aged 50 and older who contributed to 85,117 person-period records (496 from same-sex partners and 84,621 from different-sex partners).

Measures

Cognitive impairment

The measurement of cognition in HRS differs for self-respondents and proxy respondents. For self-respondents, HRS assessed cognitive function via the modified version of the Telephone Interview for Cognitive Status (TICS). A small percentage of respondents (0.8%–3.1%) refused to participate in tests of immediate and delayed recall and serial 7s; HRS has developed an imputation strategy for cognitive variables for all waves (Servais, 2010). We followed previous studies in calculating a final summary score by summing the following cognitive items: immediate and delayed recall of a list of 10 words (1 point for each), five trials of serial 7s (i.e., subtract 7 from 100, and continue subtracting 7 from each subsequent number for a total of five trials, 1 point for each trial), and backward counting (2 points). The final summary score ranges from 0 (*severely impaired*) to 27 (*high functioning*; Crimmins et al., 2016). The mean value for TICS is 17.20 for same-sex partners and 16.55 for different-sex partners in the self-report sample. We follow previous studies by using the summed scores to identify two categories: cognitive impairment (0–11) and no cognitive impairment (12–27; Crimmins et al., 2016).

For individuals who were unable to participate in the cognitive tests due to health issues, cognitive status was measured using the proxy's assessment. In these cases, we followed previous studies in assessing cognition on an 11-point scale using the proxy's assessments of (a) the respondent's memory (0 = excellent, 4 = poor) and (b) the respondent's limitations in five instrumental

activities of daily living: managing money, taking medication, preparing hot meals, using the phone, and shopping for groceries (0–5), as well as (c) the interviewer's assessment of the respondent's difficulty completing the interview because of cognitive limitations (0 = none, 1 = some, and 2 = prevented completion). Proxy respondents with a summary score of 3–11 were classified as having cognitive impairment, and those with a score of 0–2 were classified as having no cognitive impairment (Crimmins et al., 2016). See the work of Ofstedal et al. (2005) for additional information on internal consistency and other methodological issues related to the HRS cognitive measures.

Sex composition of the couple

The HRS did not ask a question about sexual orientation until 2016. In this study, we took advantage of the household survey nature of the HRS (2000–2016) to determine the sex composition of the couple. Because gender is not ascertained (i.e., clearly distinguished from sex) in the HRS, we used sex to identify same-sex and different-sex couples. However, we acknowledge that sex and gender are not always consistently aligned (Hart et al., 2019). A person was identified as a same-sex partner if the spouse/partner reported the same sex as the respondent; a person was identified as a different-sex partner if the spouse/partner reported a different sex from the respondent.

Marital status

We measured marital status as a time-varying variable reflecting the marital status at the time of the survey. Because all respondents in the focal sample were in either a same-sex or different-sex couple, the marital status variable includes two categories: 0 = married and 1 = cohabiting.

Health-rated factors

We included three blocks of health-related factors: health behaviors, mental health, and physical health. Health behaviors included smoking and drinking. *Smoking* included three categories: current nonsmoker (reference), current smoker, and missing report. *Drinking* included four categories: current nondrinker (reference), current light drinker, current heavy drinker, and missing report. Based on the recommendation of the National Institute of Alcohol Abuse and Alcoholism for older adults, respondents who reported drinking fewer than seven alcoholic beverages per week during the past 3 months were classified as light drinkers and those who consumed more than seven alcoholic beverages per week on average were coded as heavy drinkers (Liu et al., 2020).

Mental health was measured by *depressive symptoms* of the Center for Epidemiologic Studies-Depression scale. Respondents were asked the following questions with response options of "yes" or "no": much of the time during the past week, (a) "I felt depressed"; (b) "I felt everything I did was an effort"; (c) "My sleep was restless"; (d) "I was happy"; (e) "I felt lonely"; (f) "I enjoyed life"; (g) "I felt sad"; (h) "I could not 'get going'." Items 4 and 6 were reversely coded. The final depression score was a sum-up of the eight items ranging from 0 to 8. Missing values (about 6%) in depressive symptoms were imputed with the mean value.

Physical health was measured by two indicators: self-rated health and chronic conditions. *Self-rated health* was a dichotomous indicator with 0 indicating fair and poor health and 1 indicating good, very good, and excellent health. We measured *chronic conditions* using a comorbidity index (0–4) that is a summary score of the presence of four major chronic conditions: diabetes, stroke, heart disease, and high blood pressure.

Covariates

We controlled basic sociodemographic covariates including *age*, *sex* (0 = men, 1 = women), *race/ethnicity* (non-Hispanic White [reference], non-Hispanic Black, Hispanic, and other), *education* (less than high school [reference], high school graduate, some college, college graduate and above), and *total household income*. Total household income included the respondent's and the spouse's income from all sources such as earnings, pensions and annuities, Supplemental Security Income and Social Security Disability, Social Security retirement, other government transfers, unemployment and workers' compensation, household capital income, and other income for the last calendar year before the survey. We used the RAND version of household income which included consistently imputed missing values across waves (RAND HRS Data, 2016). We took the natural log of the income to adjust the skewed distribution. We also included an indicator of whether a *proxy respondent* was used to assess the cognitive status of the respondent (1 = Yes; 0 = No). All covariates were measured as time-varying variables except sex, race/ethnicity, and education, which were measured as time-invariant variables.

Statistical Analyses

We estimated multilevel mixed-effects discrete-time hazard models to handle the nested distribution of couples. Specifically, we created person-period record files and used a mixed-effects logit model for the discrete-time event history analysis. The multilevel mixed-effects models account for the lack of independence within couples by allowing random effects to vary across couples. A respondent contributes an observation for each wave up to the onset of cognitive impairment or censoring (i.e., loss to follow-up or death).

We estimated seven models. Model 1 estimated the basic difference in cognitive impairment between same-sex and different-sex partners (both married and cohabiting), controlling for all sociodemographic covariates. Models 2–5 added marital status, health behaviors (i.e., smoking and drinking), mental health (i.e., depressive symptoms), and physical health (i.e., self-rated health and chronic conditions)

separately to determine whether differences in these factors explained the cognitive health disparity between same-sex and different-sex partners. Model 6 added all covariates. Model 7 added an interaction term for sex and sex composition of the couple (i.e., same sex vs. different sex) to identify any potential sex differences in the association between sex composition of the couple and cognitive impairment, controlling for all covariates. We conducted formal mediation testing using the Karlson–Holm–Breen (KHB) method to examine whether marital status, health behaviors, mental health, and physical health had significant mediating effects. The KHB method is useful for decomposing the total effect into direct and indirect effects in nonlinear probability models such as logistic models (Karlson & Holm, 2011).

Results

Table 1 presents descriptive statistics for the analytic variables both for the total sample and separately for same-sex and different-sex partners. In the sample, a much higher proportion of same-sex partners were cohabiting (rather than married) than different-sex partners (72.98% vs. 5.42%). Same-sex partners were not significantly different from different-sex partners in terms of the proportion with cognitive impairment, although the former were younger than the latter (mean age: 60.15 vs. 64.79). Compared to different-sex partners, same-sex partners were more likely to be non-Hispanic White (85.69% vs. 77.18%), had higher levels of education (29.84% vs. 14.41% with a college degree) and higher annual household income ($121,046 vs. $88,425), and they were more likely to be current smokers (21.17% vs. 12.08%) and heavy drinkers (18.75% vs. 11.72%) and had more depressive symptoms (1.28 vs. 1.11) but fewer chronic conditions (0.77 vs. 0.94).

Table 2 presents the estimated odds ratios (ORs) for cognitive impairment from the mixed-effects discrete-time hazard models. The results of Model 1 suggest that when sociodemographic covariates were controlled, the odds of cognitive impairment were 78% (OR = 1.78, $p < .01$) higher for same-sex partners than different-sex partners. When marital status was added in Model 2, the difference in cognitive impairment between same-sex and different-sex partners became insignificant (OR = 1.33, $p > .05$). The results of Model 2 also show that cohabiting respondents had significantly higher odds of cognitive impairment than married respondents (OR = 1.53, $p < .001$) when sociodemographic covariates were controlled. Adding smoking and drinking in Model 3 did not change the estimated difference in cognitive impairment between same-sex and different-sex partners (compared to Model 1). Adding depressive symptoms in Model 4 and self-rated health and chronic conditions in Model 5 both slightly reduced the size of the estimated difference in cognitive impairment between same-sex and different-sex partners (compared to Model 1) although the difference remained statistically significant in both Models 4 and 5. After all covariates were controlled in Model 6, the difference in cognitive impairment between same-sex and different-sex partners was insignificant (OR = 1.32, $p > .05$).

We conducted formal mediation tests for marital status, health behaviors, mental health, and physical health; the results are presented in Table 3. The mediation testing results suggest that marital status mediated a significant share of the effect of the sex composition of the couple (same-sex or different-sex) on cognitive impairment. Specifically, the total effect (i.e., regression coefficient) of the couple's sex composition was 0.48, and about 52% (0.25) of this effect was mediated by marital status. Indeed, the direct effect of the sex composition of the couple on cognitive impairment was no longer statistically significant once the indirect effect of marital status was taken into account. Results in Table 3 also suggest that mental health explained 10% (i.e., 0.05/0.50) of the difference in cognitive impairment between same-sex and different-sex partners and physical health explained 6% (i.e., 0.03/0.50) of the difference, while health behavior was not a significant mediator. These results suggest that the cognitive difference between same-sex and different-sex partners was primarily due to a difference in marital status and, to a much lesser extent, differences in physical and mental health between the two groups.

We also tested the interaction between sex and couple's sex composition (Model 7 in Table 2). The interaction coefficient was not statistically significant, suggesting there was no sex difference in the association between the couple's sex composition and cognitive impairment.

Sensitivity analysis of left-censoring

One major obstacle to studying health disadvantages among older sexual minorities is small sample sizes. Because the sample of cognitively impaired same-sex partners was relatively small ($n = 39$), we retained those who had cognitive impairment at baseline (i.e., the left-censored observations, 20 same-sex partners, and 3,770 different-sex partners), assuming their risk of cognitive impairment was time-invariant before the study started (Allison, 1984). Left-censoring presents a methodological challenge that is not easily addressed with even the most sophisticated methodologies (Singer & Willett, 2003). We conducted an additional sensitivity analysis by excluding the left-censored observations (i.e., those with cognitive impairment at baseline); the results (given in Supplementary Table S1) reveal higher odds of cognitive impairment among same-sex partners relative to different-sex partners, a pattern similar in sign to the one reported in the main analysis although not statistically significant (OR = 1.35, $p = .21$) due to the smaller sample size. Importantly, excluding cognitive impairment cases at baseline may introduce selection bias related to truncation.

Discussion

Despite a burgeoning body of research on cognitive aging, the scientific understanding of cognitive health disadvantages

Table 1. Descriptive Statistics of Person-Period Files by Sexual Orientation, HRS, 2000–2016 (No. of Person-Periods = 85,117)

	Percent/Mean (*SD*)		
Variables	Total (*N* = 85,117)	Same sex (*n* = 496)	Different sex (*n* = 84,621)
Cognitive impairment (%)			
No	89.96	92.14	89.95
Yes	10.04	7.86	10.05
Marital status (%)			
Married	94.18	27.02	94.58*
Cohabiting	5.82	72.98	5.42*
Demographic covariates			
Sex (%)			
Male	49.71	46.77	49.73
Female	50.29	53.23	50.27
Age (50–100), mean (*SD*)	64.76 (9.09)	60.15 (7.40)	64.79 (9.09)*
Race/ethnicity (%)			
Non-Hispanic White	77.23	85.69	77.18*
Non-Hispanic Black	10.22	5.44	10.24*
Hispanics	6.33	2.02	6.36*
Other	6.22	6.85	6.22
Education (%)			
Less than high school	15.11	2.82	15.18*
High school	31.90	18.15	31.98*
Some college	38.49	49.19	38.43*
College and above	14.50	29.84	14.41*
Household income ($), mean (*SD*)	88,615 (183,971)	121,046 (120,595)	88,425 (184,261)*
Proxy-report (%)			
No	94.35	98.79	94.33*
Yes	5.65	1.21	5.67*
Current smoker (%)			
No	87.14	74.60	87.22*
Yes	12.14	21.17	12.08*
Missing	0.72	4.23	0.70*
Current drinker (%)			
No	58.97	44.56	59.06*
Current light drinker	28.95	36.09	28.91*
Current heavy drinker	11.76	18.75	11.72*
Missing	0.32	0.60	0.32
Depressive symptoms(0–8), mean (*SD*)	1.12 (1.66)	1.28 (1.97)	1.11 (1.66)*
Self-rated health (%)			
Fair/poor	20.97	17.74	20.99
Good/very good/excellent	79.03	82.26	79.01
Chronic conditions (0–4), mean (*SD*)	0.94 (0.93)	0.77 (0.81)	0.94 (0.93)*

Note: HRS = Health and Retirement Study; SD = standard deviation. Person-period observations are contributed by 23,669 individuals who are nested in 13,185 couples.

*Statistically significant difference between respondents in same-sex and difference-sex partners at the $p < .05$ level.

among older sexual minorities remains limited, primarily due to data limitations. Our analysis of a nationally representative sample revealed significant cognitive health disadvantages among same-sex partners relative to different-sex partners in late life. In addition, the results shed light on a key social pathway—marital status (and, to a much lesser extent, physical and mental health)—that contributes to the cognitive disparity by couple's sex composition. Next, we discuss the key findings and their implications.

First, we found that same-sex partners experienced a significantly higher risk of cognitive impairment than different-sex partners when basic sociodemographic covariates were controlled. This finding is consistent with Hypothesis 1 and aligns with the broader literature on sexual minority health disparities (Fredriksen-Goldsen et al., 2013; Liu et al., 2013). Prior research has shown that sexual minorities experience a host of health disadvantages relative to their heterosexual counterparts, including worse mental

Table 2. Estimated Odds Ratios From Mixed-Effects Discrete-Time Hazard Models, HRS, 2000–2016 (No. of Person-Periods = 85,117)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	OR (*SE*)	OR (*SE*)	OR (*SE*)	OR (*SE*)	OR (*SE*)	OR (*SE*)	OR (*SE*)
Same sex (*ref*: different sex)	1.78** (0.35)	1.33 (0.27)	1.78** (0.35)	1.69** (0.33)	1.73** (0.33)	1.32 (0.26)	1.26 (0.32)
Female (*ref*: male)	0.79*** (0.02)	0.80*** (0.02)	0.78*** (0.02)	0.75*** (0.02)	0.80*** (0.02)	0.76*** (0.02)	0.76*** (0.02)
Age	1.06*** (0.00)	1.06*** (0.00)	1.06*** (0.00)	1.06*** (0.00)	1.06*** (0.00)	1.06*** (0.00)	1.06*** (0.00)
Race/ethnicity (*ref*: non-Hispanic White)							
Non-Hispanic Black	3.59*** (0.17)	3.50*** (0.17)	3.47*** (0.16)	3.41*** (0.16)	3.30*** (0.16)	3.12*** (0.15)	3.12*** (0.15)
Hispanic	1.92*** (0.11)	1.92*** (0.11)	1.95*** (0.11)	1.81*** (0.10)	1.76*** (0.10)	1.75*** (0.10)	1.75*** (0.10)
Other	2.66*** (0.16)	2.66*** (0.16)	2.64*** (0.16)	2.54*** (0.15)	2.46*** (0.15)	2.43*** (0.15)	2.43*** (0.15)
Education (*ref*: less than high school)							
High school	0.43*** (0.02)	0.44*** (0.02)	0.45*** (0.02)	0.46*** (0.02)	0.48*** (0.02)	0.50*** (0.02)	0.50*** (0.02)
Some college	0.26*** (0.01)	0.26*** (0.01)	0.28*** (0.01)	0.29*** (0.01)	0.30*** (0.01)	0.32*** (0.01)	0.32*** (0.01)
College degree and above	0.14*** (0.01)	0.14*** (0.01)	0.15*** (0.01)	0.16*** (0.01)	0.17*** (0.01)	0.19*** (0.01)	0.19*** (0.01)
Household income (logged)	0.84*** (0.01)	0.84*** (0.01)	0.85*** (0.01)	0.85*** (0.01)	0.86*** (0.01)	0.87*** (0.01)	0.87*** (0.01)
Proxy-report (*ref*: self-report)	2.39*** (0.13)	2.41*** (0.13)	2.36*** (0.13)	2.50*** (0.13)	2.26*** (0.12)	2.36*** (0.12)	2.36*** (0.12)
Cohabiting (*ref*: married)		1.53*** (0.09)				1.41*** (0.08)	1.41*** (0.08)
Current smoker (*ref*: no)							
Yes			1.38*** (0.06)			1.23*** (0.05)	1.23*** (0.05)
Missing			0.93 (0.15)			0.95 (0.15)	0.95 (0.15)
Current drinker (*ref*: no)							
Current light drinker			0.74*** (0.03)			0.82*** (0.03)	0.82*** (0.03)
Current heavy drinker			0.79*** (0.04)			0.85** (0.04)	0.85** (0.04)
Missing			1.40 (0.26)			1.41 (0.27)	1.41 (0.27)
Depressive symptoms (0–8)				1.18*** (0.01)		1.11*** (0.01)	1.11*** (0.01)
Self-rated health (*ref:* fair/poor)					0.47*** (0.01)	0.55*** (0.02)	0.55*** (0.02)
Chronic conditions (0–4)					1.09*** (0.02)	1.07*** (0.02)	1.07*** (0.02)
Interactive effect							
Same sex × Female							1.10 (0.42)

Notes: HRS = Health and Retirement Study; OR = odds ratio; SE = standard errors (robust). Person-period observations are contributed by 23,669 individuals who are nested in 13,185 couples. Model 1 controls for sociodemographic covariates; Model 2 adds marital status; Model 3 adds health behaviors; Model 4 adds mental health; Model 5 adds physical health; Model 6 includes all covariates; and Model 7 adds an interaction term for sex × sex composition of the couple (i.e., same sex vs. different sex).
***$p < .001$, **$p < .01$, *$p < .05$.

Table 3. KHB Mediation Analysis Results by Marital Status, Health Behaviors, Mental Health, and Physical Health (No. of Person-Periods = 85,117)

	Marital status	Health behaviors	Mental health	Physical health
Total effect	0.48** (0.18)	0.51** (0.18)	0.50** (0.18)	0.50** (0.18)
Direct effect	0.23 (0.18)	0.50** (0.18)	0.46* (0.18)	0.47** (0.18)
Indirect effect	0.25*** (0.03)	0.01 (0.01)	0.05*** (0.01)	0.03* (0.01)

Notes: KHB = Karlson–Holm–Breen. Standard errors in parentheses. Person-period observations are contributed by 23,669 individuals who are nested in 13,185 couples.
***$p < .001$, **$p < .01$, *$p < .05$.

and physical health, higher rates of substance use, and lower rates of health insurance (Liu et al., 2016). Yet previous studies have provided little evidence about whether these sexual minority health disparities extend to cognitive health, which constitutes a growing public health concern in the context of rapid population aging. The current study contributes to the literature by providing some of the first population-based evidence on the cognitive health disadvantages of older sexual minorities in the United States.

Second, the study contributes to the literature by showing that the cognitive disparity between same-sex and different-sex older couples is explained mainly by a difference in marital status, a finding that supports Hypothesis 2. According to minority stress theory, structural stigma at the macro level, such as laws banning same-sex marriage and prejudice against same-sex unions, constitutes a major stressor that researchers have argued is a fundamental cause of stress and health disadvantages (Hatzenbuehler, 2009; Meyer, 2003). The current results, which show that a difference in marital status is primarily responsible for the cognitive disparity between people in same-sex and different-sex unions, are consistent with this perspective. Specifically, a significantly higher proportion of same-sex couples than different-sex couples were cohabiting rather than legally married, and cohabitation may not ensure the same level of cognitive health benefits as marriage (Liu et al., 2020), perhaps because it entails a lower level of legal and institutional protection (Waite & Gallagher, 2000). Moreover, literature on heterosexual population suggests that cohabitors are less likely than married individuals to receive support from friends and relatives (Eggebeen, 2005) and more likely to report relationship strain and experience union dissolution (Brown, 2000)—all factors that may increase the risk of cognitive impairment. Although some studies suggest that cohabitation of older couples, especially those in long-term relationships, tends to be analogous to marriage (Brown et al., 2012), a recent analysis of the HRS data found that cohabiting older adults had significantly higher risks of developing dementia than their married counterparts (Liu et al., 2020)—a pattern further confirmed in the current analysis.

The finding of higher risk of cognitive impairment of same-sex couples relative to different-sex couples may be related to social selection in the focal cohort. The vast majority of the same-sex couples in the focal sample grew up in a context where same-sex marriage was not only socially unacceptable but also illegal. Note, even after the legalization of same-sex marriage, homophobia still persists, especially in older communities, continuously leading to marriage inequality: a higher proportion of same-sex couples than different-sex couples choose not to marry in part because of homophobia (e.g., same-sex couples decide not to marry due to concerns of family rejections and/or homophobia) and/or in part because same-sex couples may hold a more critical view of marriage as a heteronormative institution (Reczek et al., 2009). Both legal restriction and homophobia against same-sex marriage as well as personal preference for not entering a marriage may hinder access to health benefits presumably associated with marriage, such as employer-sponsored insurance coverage, family recognition, and support from larger communities (Gonzales & Blewett, 2014). Lack of material and psychosocial resources from marriage may have led to the higher risk of cognitive impairment among sexual minorities. Furthermore, even when sexual minority couples can legally marry, they may not experience all of the benefits of marriage due to the stress associated with being a sexual minority (Meyer, 2003) and stress related to living in a same-sex relationship (LeBlanc et al., 2015) as well as the cumulative disadvantage from the long history of legal restriction of marriage. These sources of stress and cumulative disadvantage may lead to poorer relationship quality for same-sex unions and thus compromise the health and cognition of those in such unions (Frost et al., 2017).

Compared to marital status, health-related factors play a much less important role in explaining the cognitive difference between same-sex and different-sex partners. Although the minority stress perspective suggests that elevated stress exposure due to sexual minority status may promote unhealthy behaviors and lead to poor mental and physical health (Conron et al., 2010), our results suggest that physical and mental health only explained a small part of the difference in cognitive impairment between same-sex and different-sex partners while health behaviors (proxied by smoking and drinking) explained little of this difference. It is likely that marital status is simply a much stronger factor than health-related factors in contributing to the cognitive disadvantages of same-sex partners relative to different-sex partners. Another possibility is that our health measures were limited and did not fully capture the key health-related

components that contribute to poor cognitive health of same-sex couples. Future studies should explore additional health factors (e.g., duration of diabetes, sleep quality) in shaping cognitive health disparity of same-sex couples.

Notably, our findings show no sex difference in cognitive disparity between same-sex and different-sex older couples, suggesting that both female and male same-sex couples experienced higher risks of cognitive impairment than their different-sex counterparts. It is likely that these couples uniformly face minority stress in late life that may harm their cognitive health in similar ways. We also note that the sample of cognitively impaired respondents in same-sex couples was relatively small (n = 39). Thus, the finding of no sex difference in the key results may be due to a lack of statistical power, which is a persistent challenge in studies of health disparities among older sexual minorities. Nevertheless, even though the overall patterns are similar by sex, the underlying mechanisms through which minority stress affects cognition may differ for sexual minority subgroups. Future research should explore these possibilities.

This study has several limitations. First, the cognitive impairment classification is limited because the battery of neuropsychological tests in the HRS (like those used in all existing population-level survey data) may be less accurate than a standard neurological diagnosis examination. However, only survey-adapted tests can be administered with a large population sample. Second, because HRS did not collect sexual orientation information until 2016 and only a quarter of HRS respondents were asked about sexual orientation in 2016, we took advantage of the household survey nature of HRS (2000–2016) to identify same-sex couples without direct measures of sexual orientation. Because clinical cognitive screening measures such as the HRS cognition measures are not designed to detect age-related changes in cognition over relatively brief intervals, future studies should analyze newly collected sexual orientation data in HRS when more follow-up waves are available. Finally, the challenges and minority stressors same-sex couples face in their late life are more complex than what the current analysis has covered (Correro & Nielson, 2020). Future research should consider other important contextual factors such as regional variations in discrimination laws, practices, and attitudes that may shape cognitive aging trajectories of same-sex couples in late life.

Conclusions and Implications

In the United States, same-sex couple households are increasing at a faster rate than other household types. With the rapid aging of the U.S. population, a significant share of these same-sex couples is entering late life. For the first time, we provide population-based nationally representative evidence of a higher risk of cognitive impairment among same-sex couples than among different-sex couples in late life. Furthermore, we find that this disparity is mainly explained by the former group's lower likelihood of being married and, to a much lesser extent, by physical and mental health. Although same-sex marriage was legalized in the United States (at the national level) in 2015, prejudice and discrimination against same-sex couples persist, especially in older communities, continuously leading to marriage inequality. The current findings highlight the importance of designing and implementing public policies and programs to eliminate societal homophobia, especially among older communities, so that older same-sex couples can receive full benefits from marriage equality. This is especially important when same-sex partners face additional stressors and barriers as they become older, taking on the caregiver role of their cognitively impaired partners. Previous research has reported significantly higher levels of depression, discrimination, and stress among LGBT caregivers compared to their noncaregiving counterparts. However, very few dementia caregiving services and supports have been developed to address the unique needs of caregivers who were not related to the care recipients by marriage or blood (Fredriksen-Goldsen et al., 2018). It is high time that inclusive health care approaches be adopted and cognitive screening and caregiving services be tailored for older same-sex couples to reduce their cognitive health disadvantages as well as to provide much-needed supports to their caregivers.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None declared.

Author Contributions

H. Liu developed the conceptual framework, drafted the article, and guided the analysis. N. Hsieh, Z. Zhang, and

K. M. Langa contributed to the writing. Y. Zhang conducted the analysis.

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