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Trajectories of Depressive Symptomatology and Loneliness in Older Adult Sexual Minorities and Heterosexual Groups

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Abstract

Objectives: This article examines whether sexual minority men and women experience greater increases in depressive symptoms and loneliness with age compared to heterosexual men and women.

Methods: Using three waves of data from sexual minority ($n_{\text{Men}} = 87$ and $n_{\text{Women}} = 62$) and heterosexual ($n_{\text{Men}} = 1,297$ and $n_{\text{Women}} = 1,362$) older adults in the National Social Life, Health, and Aging Project, we used latent growth curve modeling to test whether change in depressive symptoms and loneliness varies across sexual orientation and whether annual household income and family support accounted for this change.

Results: Although differences in the growth trajectories of depressive symptoms and loneliness across sexual orientation were not observed, gender differences were. Annual household income and family support more strongly influenced initial depressive symptoms and loneliness in sexual minority men and women than in heterosexual men and women.

Conclusions: Trajectories of depressive symptoms and loneliness in older adulthood do not vary by sexual orientation. Economic and family resources may allow sexual minorities to cope effectively with depressive symptoms and loneliness.

Depressive symptoms and loneliness are highly correlated constructs that have not been studied in sexual minority status groups. Older adult members of sexual minorities are at greater risk for depressive symptomatology (Fredriksen-Goldsen, Kim, Barkan, Muraco, & Hoy-Ellis, 2013) and loneliness (Jacobs & Kane, 2012; Kim & Fredriksen-Goldsen, 2016). Increased risk of each is notable given that suicide risk, a potential consequence of depression and loneliness (Agerbo, Stack, & Petersen, 2011; Kalmar et al., 2008; Stickley & Koyanagi, 2016), is significantly higher among sexual minority adults compared to heterosexual adults (Björkenstam, Andersson, Dalman, Cochran, & Kosidou, 2016). The majority of sexual minority studies on depressive symptoms and loneliness are cross-sectional, which does not address whether longitudinal trajectories vary by sexual orientation. The purpose of the current study, thus, is to compare change in depressive symptoms and loneliness between older adult sexual minority men and women and their heterosexual counterparts.

Rates of psychiatric disorders are higher in sexual minority groups compared to heterosexual groups in the United States (U.S.) (Cochran & Mays, 2000; Gilman et al., 2001) and United Kingdom (Mercer et al., 2007). With respect to major depressive disorder and depressive symptomatology (i.e., non-clinically diagnosed depression), men who have sex with men in the National Comorbidity Survey were nearly 1.5 times more likely to be diagnosed with major depression compared to their heterosexual counterparts while women who have sex with women were nearly twice as likely to be diagnosed with major depression compared to heterosexual women (Gilman et al.). Using a broad measure of sexual minority status where participants self-reported ever having had a sexual partner of the same gender, adjusted odds ratios were higher for sexual minority men than sexual minority women (ORs 2.94 and 1.79, respectively) compared to their heterosexual counterparts in the National Household Survey of Drug Abuse (Cochran & Mays). Rates of loneliness, similarly, are higher in Dutch sexual minority groups than in heterosexual groups (Fokkema & Kuyper, 2009). Rates of loneliness in U.S. sexual minority populations are less clear, as studies on loneliness in have not included heterosexual samples (Jacobs & Kane, 2012; Kim & Fredriksen-Goldsen, 2016).

Mechanisms of Greater Depressive Symptoms and Loneliness in Sexual Minority Groups

Minority stress theory (Meyer, 2003) and social threat theory (Cacioppo, Cacioppo, & Boomsma, 2014) are used to explain why depressive symptoms and loneliness may increase with age in sexual minorities. Minority stress theory assumes that sexual minority groups experience unique stressors beyond general life stress experienced by all people, because of their belonging to a socially stigmatized group. Meyer (2003) proposed three processes unique to sexual minority groups: a distal set of processes consisting of external sources of stress; negative expectations formed from these stressful experiences; and internalized negative social attitudes about their group. Negative expectations social interactions and internalized negative attitudes may contribute to feeling unsupported (Aggarwal & Gerrets, 2014; Kuyper & Fokkema, 2010), and ineffective coping strategies in the face of discrimination (Feinstein, Davila, & Dyar, 2017). As a result, sexual minority groups may experience increases in depressive symptoms and loneliness at a point in adulthood when both decline in the general population (Fiske, Wetherell, & Gatz, 2009; Victor et al., 2002; Victor, Scrambler, Bowling, & Bond, 2005).

Social threat theory (Cacioppo et al., 2014) also may explain potential rises in depressive symptoms and loneliness among sexual minorities. Social threat assumes that people predisposed toward loneliness may feel intense desire to reaffiliate with others while simultaneously increase their vigilance for social threats of harm (e.g., rejection cues) out of need for self-protection. Sustained vigilance, in turn, leads to cognitive biases that may reinforce negative evaluations, ineffective coping, automatic negative thinking styles, and rumination that prevent reaffiliation and perpetuate feelings of loneliness. In an ethnographic study of Dutch gay men (Aggarwal & Gerrets, 2014), a common reported theme was diminished self-esteem and degraded self-worth that led to chronic feelings of increased vulnerability to social rejection. These maladaptive cognitive biases can lead to increased levels of internalized disapproval of one's own sexual orientation (Jacobs & Kane, 2012).

and negative interactions with others (Coyne, 1976) that may perpetuate depressive symptoms and feelings of loneliness.

Loneliness moderately correlates with depressive symptoms in the general population of older adults in cross-sectional (Adams, Sanders, & Auth, 2004; Cacioppo, Hawkley, & Thisted, 2010) and longitudinal studies (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). Under the minority stress model and social threat theory of loneliness, depressive symptoms and loneliness may not only increase over time in sexual minority groups but also be more strongly correlated with one another compared to heterosexual members.

Predictors of depressive symptoms and loneliness

We consider two protective factors against increasing depressive symptoms and loneliness: annual household income and family support. Sexual minority group members tend to live below the federal poverty line (Fredriksen-Goldsen, Emlet, et al., 2013) compared to heterosexual group members. Annual household income, thus, may be a salient protective mechanism against increases in depressive symptoms and loneliness in sexual minority groups. Second, social (Domènech-Abella et al., 2017) and family support (Carstensen, 1992; Fiori & Jager, 2012) might also protect against depressive symptoms and loneliness in older adulthood. We, thus, examined whether greater family support also predicted lower depressive symptom and loneliness levels in sexual minority members compared to heterosexual members.

Potential Gender Differences

Women are at greater risk for depressive symptoms and risk of exposure to factors associated with depressive symptoms (Sonnenberg, Beekman, Deeg, & van Tilburg, 2000) than men. Rates of loneliness tend to be higher in women than men (Aartsen & Jylhä, 2011; Berg, Mellstrom, Persson, & Svanborg, 1981), although null results also have been reported (Hawkley & Kocherginsky, 2018). Yet, sexual minority men may have higher risk for depressive symptoms and loneliness than sexual minority women (Kim & Fredriksen-Goldsen, 2016), although null findings have been reported, too (Björkenstam et al., 2016; Fredriksen-Goldsen, Emlet, et al., 2013). We, thus, explored differences between sexual minority status men and women.

Problems Studying Sexual Minority Status Groups in Aging Populations

Historically, population-based studies of older adults in the United States have not collected data on sexual orientation, gender identity, or sexual history (Brown & Grossman, 2014). Classification of sexual minority groups typically has been based on self-reported sexual histories (Cochran & Mays, 2000; Gilman, 2001) rather than directly assessing sexual orientation. In the current sample, a similar approach was taken. We acknowledge that using sexual histories to classify older participants as members of minority groups does not necessarily imply participants currently self-identify as gay, lesbian, or bisexual, but could indicate previous sexual exploration decades prior.

The Current Study

We used latent growth modeling to investigate differences in the longitudinal trajectories of depressive symptoms and loneliness between sexual minority men and women and their heterosexual counterparts. Additionally, we treated the individual growth parameters of depressive symptoms and loneliness as outcomes to test whether effects of annual household income and family support vary as a function of sexual orientation. We made four hypotheses. First, sexual minority status members have higher initial levels and greater increases in depressive symptoms and loneliness over time compared to their heterosexual counterparts. Second, given prior research, sexual minority men are expected to have higher initial levels and greater increases in depressive symptoms and loneliness over time compared to sexual minority women. Third, correlations between depressive symptom and loneliness individual growth parameters will be higher in sexual minority status men and women than in heterosexual men and women. Fourth, differences in household income and family support will have stronger effects on growth of depressive symptoms and loneliness in sexual minority men and women than in heterosexual men and women.

Method

Participants

The sample used for the current study was drawn from the National Social Life, Health, and Aging Project (NSHAP), which is a population-based longitudinal study of social, physical, and psychological health in Americans born between 1920 and 1947 (Waite et al., 2007). NSHAP consists of 3 waves of data, with the first wave collected in 2005–2006 using probability sampling ($N = 3,005$), the second wave collected in 2010–2011 ($N = 3,377$), and the third wave collected in 2015–2016 ($N = 4,777$). At wave 2, a subsample of spouses was added ($n = 955$); and at wave 3, a new cohort (born between 1948–1965) was added to the analysis ($n = 2,368$). Participants who provided complete responses to all depressive symptom items or loneliness items at any wave were included in the analytic sample, yielding a total sample of 2,808 participants. Sexual identity was determined using two items that assessed sexual history: “In your entire life so far, how many men have you had sex with, even if only one time?” and “In your entire life so far, how many women have you had sex with, even if only one time?” (Waite et al.). Men who responded in the affirmative to the former were coded as men who have had sex with men (MSM; $n = 87$) while women who responded in the affirmative to the latter were coded as women who have had sex with women (WSW; $n = 62$). Men who denied ever having had sex with another man were coded as heterosexual (MSW; $n = 1,297$) while women who denied ever having had sex with another woman were coded as heterosexual (WSM; $n = 1,362$). The self-identified ethnic composition is: 77.24% white/Caucasian; 16.20% black/African American; 0.75% Asian or Pacific Islander; 1.21% American Indian or Alaskan Native; 4.34% other; and 0.25% did not report. The current study was approved by the Institutional Review Board at the University of Southern California (ID: UP-17–00067).

Measures

Depressive symptoms were measured using ten items from the Center for Epidemiological-Depression scale (CESD; Radloff, 1977). The subset of items including measures that assessed feelings of depression, loss of appetite, whether everything felt effortful, restless sleep, feeling happy, whether people were unfriendly, enjoyment of life, feelings of sadness, feeling disliked by others, and could not get going. One item measuring feelings of loneliness was excluded. Items were rated on a 4-point Likert scale (“rarely or none of the time”, “some of the time”, “occasionally”, “most of the time”), with all items scaled so that higher values indicate greater depressive symptoms. Scale means were constructed for all participants. Scale reliabilities (McDonald’s ω ; McDonald, 1999) across waves 1–3 were .78, .77, .78, respectively.

Loneliness was measured using three items from the UCLA Loneliness Scale (Russell, 1996). The items assessed lack of companionship (“How often do you feel that you lack companionship?”); feeling left out (“How often do you feel left out?”); and feeling isolated from others (“How often do you feel isolated from others?”). At wave 1, three response options were given (“hardly ever (or never)”, “some of the time”, and “often”) whereas at waves 2 and 3, four response options were given (“never”, “hardly ever”, “some of the time”, and “often”). In order to put items on the same scale across waves, “never” and “hardly ever” were collapsed into a single category at waves 2 and 3. Items were summed, with scores ranging from 3–9 (higher scores indicate greater loneliness). Scale reliabilities across waves 1–3 were .69, .67, .65, respectively.

Household income was measured with a single item that asked participants to report their household income (in U.S. dollars) over the last year. Family support is an ordinal variable measured with a single item (“How many family/relatives do you feel close too?”). Response categories included “none” (0), “one” (1), “2–3” (2), “4–9” (3), “10–20” (4), and “more than 20” (5), with higher scores indicating greater family support.

Data Analysis

Descriptive statistics are presented to illustrate differences within and between waves of measurement in depressive symptoms and loneliness between sexual minority and heterosexual men and women. As participants provided up to three repeated measurements, with intervals of 5–6 years between measurements, individual longitudinal trajectory plots are presented to illustrate trends in depressive symptoms and loneliness for all sexual minority and heterosexual men and women. Smoothing lines and 95% confidence intervals (CIs) were generated using a local polynomial regression (loess) for each group.

We estimated latent growth curve models (LGM) to test for differences in initial and linear change in depressive symptoms and loneliness scores between sexual minority status and heterosexual men and women. LGMs estimate individual trajectories of change in complex research designs, particularly longitudinal designs where missing data (e.g., attrition) are expected (Bryk & Raudenbush, 1987; Finkel, Reynolds, McArdle, Gatz, & Pedersen, 2003; McArdle & Anderson, 1990; McArdle & Hamagami, 1992). The inclusion of incomplete data stabilizes both mean and variance estimates. LGMs assume that missing data are

missing at random (MAR) and give more weight in model estimation to participants providing greater numbers of measurements.

As shown in Figure 1, LGMs include the following parameters: a random intercept (I), which is the mean estimate of scores at the first wave of measurement across the sample or group, and a random linear slope (S), which is the mean linear rate of change across the entire sample or group. Intercepts and slopes are estimated for each participant and then aggregated across groups. Fixed (means) and random (variances and covariances) effects describe the distributions of each LGM parameter based on chronological age (McArdle, Ferrer-Caja, Hamagami, & Woodcock, 2002). As age at first measurement varied across individuals, participants' ages at each measurement were scaled relative to an origin of 65 years and treated as definition variables, which are variables that fix model parameters to individual data values by estimating individual factor loadings so that the time metric is common across individuals (Mehta & West, 2000). The intercepts, thus, represent the group-level mean depressive symptom and loneliness scores at age 65 while the linear slope represents the unit change per year. Significant random effects indicate individual differences in intraindividual change (Singer & Willett, 2003). For depressive symptoms (D) and loneliness (L), the LGMs are defined as:

$$D_{ij} = \gamma_{D00} + \gamma_{D10}(AGE_{ij} - 65) + \zeta_{D0i} + \zeta_{D1i}(AGE_{ij} - 65) + \epsilon_{Dij} \quad (1)$$

$$L_{ij} = \gamma_{L00} + \gamma_{L10}(AGE_{ij} - 65) + \zeta_{L0i} + \zeta_{L1i}(AGE_{ij} - 65) + \epsilon_{Lij} \quad (2)$$

D_{ij} and L_{ij} represent depressive symptom and loneliness scores, respectively, for the i^{th} individual at the j^{th} measurement; AGE_{ij} is the i^{th} individual's age at the j^{th} measurement centered at an origin of 65 years; γ_{D00} and γ_{L00} reflect mean scores at age 65; γ_{D10} and γ_{L10} represent linear rates of change; ζ_{D0i} and ζ_{L0i} are the i^{th} individual's deviation from the mean of the intercepts while ζ_{D1i} and ζ_{L1i} are the i^{th} individual's deviation from the mean of the linear slopes; and residuals ϵ_{Dij} and ϵ_{Lij} are independent and identically distributed deviations of the i^{th} individual's scores at the j^{th} measurement from the expected linear trajectory.

Covariance structure analysis enables estimation of the covariances between intercepts and slopes within and between latent constructs:

$$\text{Cov}[\zeta] = \begin{bmatrix} \sigma_{\zeta D_0}^2 & \sigma_{\zeta D_0 \zeta D_1} & \sigma_{\zeta D_0 \zeta L_0} & \sigma_{\zeta D_0 \zeta L_1} \\ \sigma_{\zeta D_0 \zeta D_1} & \sigma_{\zeta D_1}^2 & \sigma_{\zeta D_1 \zeta L_0} & \sigma_{\zeta D_1 \zeta L_1} \\ \sigma_{\zeta D_0 \zeta L_0} & \sigma_{\zeta D_1 \zeta L_0} & \sigma_{\zeta L_0}^2 & \sigma_{\zeta L_0 \zeta L_1} \\ \sigma_{\zeta D_0 \zeta L_1} & \sigma_{\zeta D_1 \zeta L_1} & \sigma_{\zeta L_0 \zeta L_1} & \sigma_{\zeta L_1}^2 \end{bmatrix} \quad (3)$$

Under the current hypothesis that minority stress and social threat operate in tandem for sexual minority status groups, the expectation is that that the correlation between intercepts $\left(r_{\zeta D_0 \zeta L_0} = \sigma_{\zeta D_0 \zeta L_0} / \sqrt{\sigma_{\zeta D_0}^2 \sigma_{\zeta L_0}^2}\right)$ and slopes $\left(r_{\zeta D_1 \zeta L_1} = \sigma_{\zeta D_1 \zeta L_1} / \sqrt{\sigma_{\zeta D_1}^2 \sigma_{\zeta L_1}^2}\right)$ are stronger for sexual minority men and women compared to heterosexual men and women, respectively.

Next, we regressed the intercepts and slopes on annual household income and family support to test the hypothesis that effects of income and family support on initial and linear slopes are stronger in sexual minority groups than in heterosexual groups.

All models were fit in *Mplus* 8.0 (Muthén & Muthén, 1998–2017) using full-information maximum likelihood with robust standard errors to account for missing data under the MAR assumption (Enders, 2010; Little, 1995), nonindependence of observations (i.e., clustering of respondents and their partners) and violations of multivariate normality. Given the complex survey data design of NSHAP, standard errors and model fit statistics (e.g., chi-square estimates) take into account the non-independence of clustered observations. The Wald χ^2 test was used to compare parameter estimates. Given the relatively large number of statistical tests performed, we used a conservative alpha level of .01.

Results

Descriptive Results

Table 1 presents the means and standard deviations of depressive symptoms and loneliness across the three waves. Unadjusted for age differences within and between measurements, depressive symptoms scores (labeled CES-D) in the MSM group were slightly higher than the MSW group and were nearly equal in magnitude as the WSW group. CES-D scores were nearly identical across both female (WSM and WSW) groups. CES-D scores declined over waves in the MSW and the WSW groups while scores were nonlinear across waves in the MSM and WSM groups.

For loneliness (labeled UCLA), scores were nonlinear across groups, with WSM and WSW groups reporting higher scores at wave 1, but WSW reporting lower scores than WSM at wave 3. In the male groups, MSM reported higher scores at wave 2 and wave 3 compared to MSW, on average.

Finally, the MSM group reported slightly less family support than all other groups, and men reported higher annual household incomes than women, with MSW reporting the highest annual income and WSM the lowest annual income.

Figure 2 presents the longitudinal trajectory plots of depressive symptoms (a) and loneliness (b) scores by age. The thin, colored lines represent individual participants' trajectories while the thick colored lines are smoothing lines for each sexual orientation group. Depressive symptom (CES-D) scores are relatively constant across ages, with the exception that MSM participants reported increases in symptoms beginning around age 80 while WSM reported decreases in symptoms at about the same age. MSW and WSW show slight linear increases in with age.

For loneliness, scores tend to be low, with participants' clustering at the minimum value of three, suggesting a large group of participants who do not report feelings of loneliness. On average, however, the trajectory of WSM tended to be higher than all other groups and monotonically increases starting around the mid-70s. The trajectory of MSM begins low – around the same values as MSW – and increases after age 80. For WSW, the trajectories decline with age, starting higher than all other groups and ending in late adulthood with the lowest level of loneliness. The trajectory of MSW is relatively flat.

Multivariate Results

Table 2 presents the growth parameters for depressive symptoms and loneliness for each sexual orientation group. Intercepts (γ_{D0} and γ_{L0}) were statistically significant, however these values did not significantly differ when set equal within gender, that is MSW equals MSM and WSM equals WSW (Wald $\chi^2 = 5.62$, $df = 4$, $p = .229$). The depressive symptom slope for WSM was statistically significant while the slope for MSW trended toward significant ($p = .025$). The loneliness slope effects for WSM and MSM also were marginally significant ($p = .077$ and $.109$, respectively). Given the relatively small magnitudes of the slopes across groups, significant differences were not observed when set equal within gender (Wald $\chi^2 = 6.77$, $df = 4$, $p = .149$). Furthermore, MSM individual growth parameters did not differ from WSW (Wald $\chi^2 = 6.08$, $df = 4$, $p = .193$), suggesting no differences between sexual minority men and women. There was, however, a statistically significant difference between male and female growth parameters for depressive symptoms and loneliness (Wald $\chi^2 = 42.03$, $df = 12$, $p < .001$).

Next, we tested the correlations between the intercepts and slopes of depressive symptom and loneliness across sexual orientation and observed nonsignificant group differences (Wald $\chi^2 = 0.24$, $df = 4$, $p = .993$). For MSW and MSM, the correlations between intercepts were .74 and .75, respectively while the correlations between slopes were .60 and .97, respectively, with a large – and likely inadmissible – standard error of 2.32 of the latter. For WSM and WSW, the correlations between intercepts were .73 and .81 while the correlations between slopes were .80 and .97, respectively. For the women, the pattern of differences, however, was as predicted by both models.

Finally, we tested whether annual household income and family support accounted for individual differences in the individual growth parameters of depressive symptoms and loneliness. Parameter estimates are presented in Table 3. Annual household income did not predict differences in the intercepts (Wald $\chi^2 = 9.46$, $df = 4$, $p = .051$) or slopes (Wald $\chi^2 = 2.96$, $df = 4$, $p = .565$), although the former was marginally significant. Family support did not predict differences in the intercepts (Wald $\chi^2 = 7.50$, $df = 4$, $p = .112$) or slopes (Wald $\chi^2 = 8.91$, $df = 4$, $p = .062$), although the latter was marginally significant. A few regression effects in Table 3, however, are worthy of comment despite marginal statistical significance. First, annual household income had the largest influence on the intercepts of depressive symptoms and loneliness in the MSM group, particularly for depressive symptoms. Second, greater family support predicted lower initial scores for depressive symptom in MSW and WSM, but not in the MSM or WSW groups. Third, family support

had the largest effect on the intercept of loneliness in the WSW group, as the effect was nearly 2.2 times larger in this group compared to MSW and WSM.

Discussion

Trajectories of depressive symptoms and loneliness in sexual minority men and women do not significantly differ from their heterosexual counterparts, contrasting with previous cross-sectional studies (Cochran & Mays, 2000; Gilman et al., 2001; Mercer et al., 2007). Differences that were observed emerged along gender lines. Effects of family support and annual household income on initial scores suggest sexual minority status groups have better outcomes when social and economic support mechanisms are in place.

We posited that a combination of negative expectations associated with minority stress and sustained vigilance toward social threats of harm would cause sexual minorities to experience increases in depressive symptoms and loneliness with increasing age. The null differences observed across sexual status in the current study contrast with findings in three epidemiological studies (Cochran & Mays, 2000; Gilman et al., 2001; Mercer et al., 2007). A key difference between these studies and NSHAP is the age of measurement. All three studies focused on early middle age (30s and 40s) whereas the NSHAP focuses on late adulthood. One possibility is that all older adults, regardless of sexual status, experience fewer depressive symptoms and loneliness overall and little fluctuation of each in late adulthood. Indeed, the current findings fit well with findings that indicate few group differences in depressive symptoms (Blazer, 2003; Fiske et al., 2009) and little to no increase in both depressive symptoms (Fiske et al., 2009) and loneliness (Victor et al., 2005).

There is little doubt that sexual minority groups experience forms of stress not experienced by heterosexual groups in the form of bias, discrimination, and harassment (Myer, 2003). The similarity between growth parameters across sexual orientations may suggest that older adult sexual minority group members marshal resources to cope with minority stress in ways that cause them to resemble heterosexual groups – at least with respect to depressive symptoms and loneliness. The current findings differ from differences in loneliness found between Dutch sexual minority status and heterosexual groups (Fokkema & Kuypers, 2009), a difference possibly attributed to clearer definition of sexual minority status than in the current study. Further research in U.S sexual minority samples may elucidate how sexual minority groups manage bias and discrimination to further understand the null results observed here.

Depressive symptom levels are stable across older adulthood if only slightly increasing (Beekman et al., 2002; Fiske et al., 2009; Kessler, Foster, Webster, & House, 1992), which we observed in sexual minorities, too. Despite slight positive linear slopes in heterosexual men and women, the trajectory plots illustrate similarity in depressive symptom trends across all groups. Further, lack of differences in the trajectories of depressive symptoms does not necessarily imply that clinical treatment is the same. Symptom structures may differ in sexual minority groups from heterosexual groups (Nesselroade & Molenaar, 2016), and future research should consider etiological differences in depressive symptoms and loneliness between sexual minority status groups and heterosexual groups.

There were similar loneliness trends between sexual minority men and heterosexual women, potentially suggesting that loss of male partners among older adults may explain the rise in their loneliness levels with age. As men have greater mortality risk in general (Austad, 2006), and sexual minority in particular (Cochran & Mays, 2011), heterosexual women and sexual minority men who live to old-old age may be at greater risk of loneliness as they lose partners and friends to death.

Post-hoc probing of the data suggests that gender differences occurred in the initial levels of depressive symptoms and loneliness, but not the linear slopes. The rank order differences between men and women fall along gender lines (Fiske, Gatz, & Pedersen, 2003; Fiske et al., 2009; Jansson et al., 2004; Nolen-Hoeksema, Larson, & Grayson, 1999) and loneliness (Aartsen & Jylhä, 2011; Berg et al., 1981; Borys & Perlman, 1985; Shankar, Hamer, & Steptoe, 2017). Notably, however, similarity in rates of change of depressive symptoms and loneliness were observed across gender, consistent with findings in other large population-based samples (Cacioppo et al., 2006; Fiske et al.; Hawkey & Kocherginsky, 2018; Kessler et al., 1992).

Minority stress and social threat may explain why women tended to report higher levels of depressive symptoms and loneliness. Women may experience bias, prejudice, and stigma associated with femininity, which could be sources of chronic stress and heightened vigilance toward social threats not experienced by men (Fiske, Bersoff, Borgida, Deaux, & Heilman, 1991; Rudman & Glick, 2001). The accumulation of stress and sustained vigilance toward threats across decades of experience may not cause men and women to diverge in depressive symptoms and loneliness in older adulthood, but rather could be a source of stable differences between them (Bromberger & Matthews, 1996). In support of this hypothesis is that the correlations between true initial levels of depressive symptoms and loneliness are nearly equal, suggesting only differences in the means.

Several alternative explanations may account for why women experience greater initial levels of depressive symptoms and loneliness. First, the stress and strain hypotheses posits that women experience greater stress and strain over their lives that, in turn, causes greater symptom reports (Nolen-Hoeksema et al., 1999), consistent with minority stress models. Second, the recurrence of depression hypothesis posits that men and women are equally likely to develop depressive symptoms initially, but women are more likely to experience subsequent symptoms (Hankin et al., 1998). Third, women may be more comfortable disclosing true levels of depressive symptoms compared to men (Kockler & Heun, 2002) or possibly experience symptoms more intensely (Fujita, Diener, & Sandvik, 1991). Each of these explanations, however, is speculative, as none could be directly tested in the current report.

Finally, the current findings help to clarify how financial and family support might reduce stress in the lives of sexual minority men and women. Higher levels of annual income and family support predicted lowest levels of depressive symptoms and loneliness in sexual minority status men and women. Annual income had the strongest effects on initial levels of depressive symptoms and loneliness in sexual minority men while higher family support predicted lowest initial levels of depressive symptoms in sexual minority women. For sexual

minority groups, greater earning power and stronger family support may counterbalance stress incurred via discrimination and prejudice based on sexual orientation (Meyer, 2003), providing needed coping resources.

Aging studies that include sexual minority status groups are rare, with longitudinal studies even rarer. The primary strength of the current study, thus, is examining trajectories of depressive symptoms and loneliness of older adult sexual minority men and women against their heterosexual counterparts. To our knowledge this is the first study to evaluate longitudinal change in depressive symptoms and loneliness in older adult sexual minorities. An additional strength of the current study is the representativeness of the NSHAP sample, as the results can be safely generalized to the U.S. population of older adult sexual minority men and women.

There are several limitations to the current study. First, the assessment of participants' history of same-sex sexual partners used to operationalize sexual minority groups is inadequate in general, but may be especially inadequate in older adult samples. The items may select on decades old sexual exploration in participants who later identify as heterosexual. Future studies should directly assess sexual orientation.

A second limitation is the specification of the model selected. While latent growth curve models are useful for evaluating linear change, an autoregressive model specifying time constant and time-varying effects also may be appropriate (Steyer, Schmitt, & Eid, 1999). Additionally, there may be two different trends in loneliness – one for young-old age and one for old-old age. The benefit of a latent growth curve modeling, however, is the ability to handle heterogeneity in ages and numbers of measurement, although we note that the assumption that the same growth pattern across older adulthood may not hold.

A third limitation is that measuring depressive symptomatology may miss important differences between sexual minority and heterosexual groups, as group differences in late adulthood often are minimal (Blazer, 2003). Further, use of the CES-D is limited by its emphasis on depressed mood as opposed to psychomotor symptoms (Gay, Kottorp, Lerdal, & Lee, 2016).

A final limitation is that we limited our study to two covariates, annual household income and family support. These variables were chosen because of their salience in the lives of sexual minorities (Myer, 2003). Other covariates also may matter, like education, friend support, partner (living alone) status, and physical health variables.

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Clinical Implications:

Clinicians should be cautious about assuming that older sexual minority group members are more susceptible to depressive symptoms and loneliness than heterosexual groups by virtue of their sexual preference.

Clinical Implications

1. Clinicians should be cautious about assuming that sexual minority groups' clinical presentation of depressive symptoms and loneliness is different by virtue of their sexual preference.
2. Women may experience unique forms of stress that explain higher self-reported depressive symptoms and loneliness.
3. Support characteristics, like financial resources and family support, should be considered when conducting case conceptualizations of sexual minority men and women.

Figure 1.

Correlated latent growth curve model. CESD = depressive symptoms scores; UCLA = loneliness scores; D_I = latent intercept for depressive symptoms; D_S = latent slope for depressive symptoms; L_I = latent intercept for loneliness; L_S = latent slope for loneliness; u = residual score for depressive symptoms; v = residual score for loneliness; $a1=a3$ = individual varying ages of measurement centered at age 65; 1 indicate fixed paths; * indicate parameter estimates.

Figure 2. Longitudinal trajectories of CES-D depression (a) and UCLA loneliness (b) scores for each group. MSW = men who have sex with women; WSM = women who have sex with men; MSM = men who have had sex with men; WSW = women who have had sex with women.

Table 1.

Descriptive Statistics

Sexual Minority Status Groups								
	Men				Women			
	<i>n</i>	<i>M</i>	<i>SD</i>	Min, Max	<i>n</i>	<i>M</i>	<i>SD</i>	Min, Max
CES-DT1	80	1.49	0.39	1, 2.6	58	1.50	0.50	1, 3.1
CES-D T2	59	1.43	0.38	1, 2.6	43	1.45	0.48	1, 3.7
CES-D T3	42	1.48	0.50	1, 3.1	34	1.44	0.37	1, 2.5
UCLA T1	75	3.91	1.36	3, 9	50	4.20	1.39	3, 8
UCLA T2	59	4.27	1.62	3, 8	41	4.34	1.39	3, 7
UCLAT3	40	4.05	1.55	3, 8	35	3.97	1.50	3, 9
Family Support T1	84	2.64	1.16	0, 5	60	2.83	0.99	0, 5
Household Income T1	77	54481.39	53479.48	6000,350000	48	47922.92	43135.76	6000,250000
Heteronormative Groups								
	Men				Women			
	<i>n</i>	<i>M</i>	<i>SD</i>	Min, Max	<i>n</i>	<i>M</i>	<i>SD</i>	Min, Max
CES-D T1	1180	1.41	0.44	1, 3.9	1208	1.50	0.47	1, 3.7
CES-D T2	918	1.37	0.39	1, 3.2	940	1.46	0.44	1, 3.2
CES-D T3	604	1.37	0.37	1,2.9	673	1.48	0.45	1, 3.4
UCLA T1	1035	3.89	1.30	3, 9	1110	4.18	1.48	3, 9
UCLA T2	794	4.07	1.47	3, 9	833	4.26	1.49	3, 9
UCLAT3	575	3.85	1.29	3, 9	654	4.19	1.45	3, 9
Family Support T1	1214	2.79	1.12	0, 5	1300	2.95	1.04	0, 5
Household Income T1	1009	60724.36	85496.97	0,1800000	904	42656.42	70352.09	60,1000000

Notes. CES-D = 10-item center for epidemiological depression scale; UCLA = 3-item UCLA loneliness scale; T1 = intake measurement; T2 and T3 equal wave 2 and wave 3 follow-up scores, respectively; household income reported in USD.

Table 2.**Bivariate Linear Growth Curve Model Parameter Estimates**

	WSM		MSW		MSM		WSW	
Fixed Effects	Est	SE	Est	SE	Est	SE	Est	SE
γ_{D0}	1.47	0.02	1.40	0.01	1.48	0.05	1.48	0.07
γ_{D1}	0.04	0.01	0.03	0.01	-0.02	0.04	0.02	0.06
γ_{L0}	4.17	0.05	3.97	0.04	3.89	0.17	4.35	0.19
γ_{L1}	0.07	0.04	0.04	0.04	0.25	0.16	-0.12	0.15
Variance Components								
Level-1								
σ^2_{eL}	0.93	0.04	0.93	0.04	0.93	0.04	0.93	0.04
σ^2_{eD}	0.08	0.00	0.08	0.00	0.08	0.00	0.08	0.00
Level-2								
ζ_{D0}	0.14	0.01	0.11	0.01	0.09	0.03	0.14	0.08
ζ_{D1}	0.04	0.01	0.01	0.01	0.04	0.08	0.07	0.06
ζ_{L0}	1.26	0.11	1.03	0.11	1.25	0.46	1.00	0.30
ζ_{L1}	0.37	0.08	0.04	0.09	0.51	0.51	0.32	0.65
$\sigma_{\zeta D0 \zeta D1}$	-0.03	0.01	-0.01	0.01	-0.02	0.04	-0.05	0.06
$\sigma_{\zeta D0 \zeta L0}$	0.31	0.03	0.25	0.03	0.25	0.11	0.30	0.10
$\sigma_{\zeta D0 \zeta L1}$	-0.08	0.03	-0.02	0.03	-0.10	0.14	-0.13	0.15
$\sigma_{\zeta D1 \zeta L0}$	-0.08	0.03	-0.04	0.03	-0.08	0.10	0.02	0.12
$\sigma_{\zeta D1 \zeta L1}$	0.09	0.02	0.01	0.02	0.13	0.16	0.15	0.20
$\sigma_{\zeta L0 \zeta L1}$	-0.29	0.09	-0.05	0.08	-0.29	0.48	-0.07	0.34

Notes. γ = fixed effects; ζ = random effects; D0 = depressive symptom intercept; D1 = depressive symptom linear slope; L0 = loneliness intercept; L1 = loneliness linear slope;

Table 3.

Intercepts and slopes as outcomes parameter estimates

	WSM		MSW		MSM		WSW	
Fixed Effects	Est	SE	Est	SE	Est	SE	Est	SE
γ_{D0}	1.63	0.05	1.54	0.04	1.39	0.10	1.76	0.23
γ_{D1}	-0.01	0.04	-0.04	0.03	0.26	0.17	0.24	0.18
γ_{L0}	4.78	0.16	4.44	0.12	4.14	0.44	5.56	0.54
γ_{L1}	-0.09	0.13	-0.06	0.10	0.76	0.52	0.01	0.53
γ_{2D0}	-0.13	0.02	-0.10	0.03	-0.25	0.07	-0.13	0.11
γ_{2D1}	0.03	0.02	0.02	0.02	0.13	0.07	0.11	0.10
γ_{2L0}	-0.34	0.05	-0.21	0.07	-0.84	0.23	-0.33	0.26
γ_{2L1}	0.09	0.05	0.01	0.04	0.12	0.23	0.21	0.22
γ_{3D0}	-0.05	0.02	-0.05	0.01	0.05	0.04	0.09	0.06
γ_{3D1}	0.01	0.01	0.02	0.02	-0.10	0.06	-0.08	0.05
γ_{3L0}	-0.19	0.05	-0.16	0.04	-0.07	0.15	-0.42	0.17
γ_{3L1}	0.04	0.04	0.03	0.03	-0.19	0.18	-0.03	0.16
Variance Components								
Level-1								
σ^2_{eL}	0.93	0.04	0.93	0.04	0.93	0.04	0.93	0.04
σ^2_{eD}	0.08	0.00	0.08	0.00	0.08	0.00	0.08	0.00
Level-2								
ζ_{D0}	0.12	0.01	0.10	0.01	0.07	0.02	0.13	0.07
ζ_{D1}	0.04	0.01	0.01	0.01	0.01	0.02	0.02	0.05
ζ_{L0}	1.12	0.11	0.95	0.10	1.01	0.25	0.71	0.25
ζ_{L1}	0.37	0.08	0.06	0.09	0.23	0.27	0.03	0.09
$\sigma_{\zeta D0 \zeta D1}$	-0.03	0.01	-0.01	0.01	0.01	0.02	-0.04	0.03
$\sigma_{\zeta D0 \zeta L0}$	0.26	0.03	0.22	0.03	0.22	0.03	0.22	0.03
$\sigma_{\zeta D0 \zeta L1}$	-0.07	0.03	-0.03	0.02	-0.03	0.02	-0.03	0.02
$\sigma_{\zeta D1 \zeta L0}$	-0.07	0.03	-0.02	0.02	-0.02	0.02	-0.02	0.02
$\sigma_{\zeta D1 \zeta L1}$	0.09	0.02	0.02	0.02	0.02	0.02	0.02	0.02
$\sigma_{\zeta L0 \zeta L1}$	-0.26	0.08	-0.05	0.08	-0.15	0.22	-0.02	0.54

Notes. γ = fixed effects; ζ = random effects; D0 = depressive symptom intercept; D1 = depressive symptom linear slope; L0 = loneliness intercept; L1 = loneliness linear slope; γ_2 = within-person regression weight for annual household earnings (grand mean-centered log units); γ_3 = within-person regression weight for self-reported family support.