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Successful Aging Among LGBT Older Adults: Physical and Mental Health-Related Quality of Life by Age Group

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Decision Editor: Rachel Pruchno, PhD

Purpose: Lesbian, gay, bisexual, and transgender (LGBT) people are a health disparate population as identified in *Healthy People 2020*. Yet, there has been limited attention to how LGBT older adults maintain successful aging despite the adversity they face. Utilizing a Resilience Framework, this study investigates the relationship between physical and mental health-related quality of life (QOL) and covariates by age group.
Design and Methods: A cross-sectional survey of LGBT adults aged 50 and older (*N* = 2,560) was conducted by Caring and Aging with Pride: The National Health, Aging, and Sexuality Study via collaborations with 11 sites across the U.S. Linear regression analyses tested specified relationships and moderating effects of age groups (aged 50–64; 65–79; 80 and older).
Results: Physical and mental health QOL were negatively associated with discrimination and chronic conditions and positively with social support, social network size, physical and leisure activities, substance nonuse, employment, income, and being male when controlling for age and other covariates. Mental health QOL was also positively associated with positive sense of sexual identity and negatively with sexual identity disclosure. Important differences by age group emerged and for the old–old age group the influence of discrimination was particularly salient.
Implications: This is the first study to examine physical and mental health QOL, as an indicator of successful aging, among LGBT older adults. An understanding of the configuration of resources and risks by age group is important for the development of aging and health initiatives tailored for this growing population.

Key words: Lesbian, Gay, Bisexual, Transgender, (LGBT) Aging, Health, Diversity, Healthy aging, Successful aging, Life course

Reflective of the increasing diversity of older adults, lesbian, gay, bisexual, and transgender older adults are a growing population. Based on population estimates, 2.4% of adults aged 50 and older identify as lesbian, gay, bisexual, or transgender (LGBT) (Fredriksen-Goldsen, Kim, Barkan, Muraco, & Hoy-Ellis, 2013; Fredriksen-Goldsen & Kim, 2014), accounting

for more than 2.4 million older adults. Given the number of older adults in the United States is projected to more than double by 2030 (Jacobsen, Mather, Lee, & Kent, 2011), LGBT adults aged 50 and older will number more than 5 million within a few decades.

In *Healthy People 2020* LGBT people are for the first time identified in the U.S. national health priorities (U.S. Department of Health and Human Services [DHHS], 2012), with the Institute of Medicine (2011) concluding that insufficient information exists on the health of LGBT people. Although LGBT older adults remain a largely invisible and under-studied group, there is accumulating evidence of health disparities among LGBT older adults, as an at-risk population. Compared with heterosexuals of similar age, lesbian, gay male, and bisexual older adults are more likely to experience poor health, disability, and mental distress (Fredriksen-Goldsen, Kim, et al., 2013; Wallace, Cochran, Durazo, & Ford, 2011) as well as to engage in some adverse health behaviors including smoking and excessive drinking (Fredriksen-Goldsen, Kim, et al., 2013). Transgender older adults, compared to nontransgender LGB older adults, experience elevated risks of poor physical health, disability, depressive symptomatology, and perceived stress (Fredriksen-Goldsen, Cook-Daniels, et al., 2014).

In one of the first studies examining the risk and protective factors associated with poor general health, disability, and depression among LGB older adults, we identified several key risk factors including lifetime victimization, internalized stigma, lack of health care access, obesity, and limited physical activity as well as protective factors including social support and social network size among LGB older adults (Fredriksen-Goldsen, Emlet, et al., 2013). Although our earlier research focused on identifying predictors associated with poor health outcomes (Fredriksen-Goldsen, Emlet, et al., 2013), an equally important goal is to identify ways in which LGBT older adults can achieve health equity, defined as the opportunity to attain full health potential (Whitehead & Dahlgren, 2007).

Early pioneering research on positive aspects of sexual minority aging dates back to the 1960s. The first wave of sexual minority aging research sought to dispel myths characterizing older gay men and lesbians as "lonely," "unhappy," and "leading unsatisfied lives" (Fredriksen-Goldsen & Muraco, 2010). Some of these early studies countered the existing stereotypes by addressing the capacities of older sexual minorities for social engagement (Francher & Henkin, 1973; Kelly, 1977), family life (Berger, 1980; Friend, 1980), sexual activity (Kimmel, 1978), and psychological adaptation (Weinberg, 1970). The majority of these studies countered the notion that lesbian and gay male older adults age worse compared with older adults in the general population (Gabbay & Wahler,

2002; Wahler & Gabbay, 1997); in fact, some maintained that through "crisis competence," first coined by Kimmel (1978), successful adjustment to being gay in earlier life, as a stigmatized identity, enhanced sexual minority older adults' ability to adjust to old age. In one of the few recent studies to address positive aspects of aging among LGBT older adults, Van Wagenen, Driskell, and Bradford (2013), drawing upon qualitative interviews with 22 older adults, identified ways of coping that led to variations in successful aging across physical, mental, emotional, and social domains.

For the current study, we shift our focus from our previous research investigating health disparities to factors associated with the subjective evaluation of physical and mental health-related quality of life (QOL) as important indicators of successful and healthy aging. According to Young, Frick, and Phelan (2009) successful aging is defined as "a state wherein an individual is able to invoke adaptive psychological and social mechanisms to compensate for physiological limitations to achieve a sense of well-being, high self-assessed QOL, and a sense of personal fulfillment, even in the context of illness and disability" (pp. 88–89). This definition suggests that successful aging is a multidimensional construct encompassing important subjective aspects in addition to the objective criteria (Baltes & Baltes, 1990; Pruchno, Wilson-Genderson, & Cartwright, 2010), which we applied in our earlier studies (Fredriksen-Goldsen, Emlet, et al., 2013.)

In the past two decades, an increasing number of studies (Pruchno et al., 2010; Strawbridge, Wallhagen, & Cohen, 2002) began to recognize the importance of the subjective experience as a necessary and independent component of successful aging in addition, and complementary, to more objective definitions and criteria as proposed by Rowe and Kahn (1987). "Extraordinarily plastic, adaptive, and able to compensate," psychological mechanisms involved in self-assessment of health can provide differing evaluations of successful aging relative to objective criteria (Baltes & Baltes, 1990, p. 6).

According to the Centers for Disease Control and Prevention (CDC), health-related QOL is defined as "an individual's or group's perceived physical and mental health" (2000, p. 8). As the CDC asserts, it is crucial to track and monitor health-related QOL in an effort to improve overall QOL and well-being. In fact, *Healthy People 2020* established health-related QOL as a foundational measure. Health-related QOL is composed of two primary components, physical health QOL and mental health QOL, validated across numerous studies (Gandek, Sinclair, Kosinski, & Ware, 2004; Ware & Sherbourne, 1992). In this study we assess physical and mental health QOL, as subjective components of successful aging, taking into consideration

multidimensional factors and age group differences among LGBT older adults.

Resilience Framework

To better understand the ways in which LGBT older adults achieve full health potential and successful aging, a resilience model incorporating a multidimensional and life course perspective including the larger social context as well as personal and social resources is essential. Resilience, defined as behavioral, functional, social, and cultural resources and capacities utilized under adverse circumstances (Fredriksen-Goldsen, 2007), is important for cultivating successful aging. In fact, resilience is critical to understanding how older adults can maintain QOL and successful aging in light of adversity (Netuveli & Blane, 2008). If resilience is the pattern of functioning associated with positive adaptation in the context of adversity, it is important to examine risk and protective factors that lead to successful aging (Lavretsky, 2012), especially considering the potential for losses typically seen as part of the aging process (such as chronic illnesses, bereavement, and social risks).

In this paper based on the Resilience Framework, we will examine the association of five dimensions as they relate to QOL, as an indicator of successful aging, including: (a) social risks (lifetime victimization and discrimination); (b) identity management resources (positive sense of sexual identity, identity disclosure, time length of disclosure); (c) social resources (partnered or married, social network size, religious or spiritual activity, social support, community connectedness); (d) health-promoting behaviors; (physical activity, leisure activity, routine health check-up, substance nonuse); and (e) socioeconomic resources (income, employment, and education).

The Resilience Framework allows us to examine both risk and protective factors contributing to physical and mental health QOL. Based on the Resilience Framework, LGBT older adults may experience unique factors due to the social and historical context of their lives, such as experiences of victimization and discrimination, identity management and disclosure, and diverse social networks and supports. To date, however, these multidimensional factors, including those unique to LGBT older adults, have not been adequately examined relative to physical and mental health QOL.

In addition, LGBT older adults have much in common with older adults in general. Social resources including social network, social participation, social support (Johnson & Mutchler, 2013), religious activities (Meisenhelder & Chandler, 2002), health-promoting behaviors including physical (Bize, Johnson, & Plotnikoff, 2007) and leisure (Dupuis & Alzheimer, 2008) activities, health care access

(Thompson, Zack, Krahn, Andresen, & Barile, 2012), and socioeconomic resources (Robert et al., 2009) may be important predictors of physical and mental health QOL in these populations.

Equally important, the Resilience Framework allows us to assess the moderating role of age groups (aged 50–64, young–old age group; 65–79, middle–old age group; 80 and older, old–old age group), using terminology similar to that which was first conceptualized by Neugarten (1974). Because this is the first study of LGBT aging with a majority of participants over the age of 60 and a sizable group aged 80 and older, we are able to examine differences across these age groups.

LGBT older adults may experience aging-related challenges in their physical and mental health QOL as observed in the general population. Longitudinal data (Luo, Xu, Granberg, & Wentworth, 2012) suggest that physical health QOL may deteriorate with age because poor general health, functional limitations, and chronic conditions are more prevalent among the older population. Age-stratified studies have also found that rates of poor mental health may decrease with age up to the young–old age group; however, among the old–old the rate increases (Corona et al., 2010).

Situating the Resilience Framework within a life course perspective provides a means for taking into consideration both the unique needs of LGBT older adults and the period and cohort effects that differentiate their experiences, including the interplay of historical times, the timing of social roles and events, the linked and interdependent nature of lives, and human agency (Elder, 1994, 1998). LGBT adults of varying age groups have experienced differing historical and social contexts over the life course given the shifting social climate. LGBT older adults of the Greatest and Silent Generations (those growing up or born during the Great Depression and/or World War II), came of age at a time when homosexuality was severely stigmatized and criminalized, prior to the modern gay liberation movement. These LGBT older adults are likely to experience pervasive silence about sexual and gender identity. Those of the Baby Boom Generation came of age during tremendous social change reflective of the Stonewall riots and the civil rights and women's movements, as well as the shifting context that occurred during the height of the AIDS pandemic. During this period, LGBT people became more visible socially and politically. Although this cross-sectional study cannot adequately distinguish cohort effect and age effect, it can provide important insights for identifying modifiable factors to promote successful aging among LGBT older adults of differing age groups.

Based on the Resilience Framework, we hypothesize the following: (a) the levels of physical and mental health QOL differ by age groups among LGBT older adults; (b) factors

specified in the model (including social risks, identity management resources, social resources, health-promoting behaviors, socioeconomic resources, and background characteristics) are significantly associated with physical and mental health QOL (main effects), independent of age group effect and other covariates; and, (c) there are age group differences in the influence of the explanatory factors on physical and mental health QOL among LGBT older adults (interaction effects).

Methods

To test these hypotheses, we use data from Caring and Aging with Pride: The National Health, Aging and Sexuality Study, the first national and federally funded study to assess the health and well-being of LGBT older adults. From June to November 2010, survey participants were recruited through a community-based collaboration with 11 sites across the United States. Inclusion criteria for the study included age 50 and older and self-identification as LGBT. Utilizing organizations' contact lists, potential participants were invited to complete and return a questionnaire, with two questionnaire reminder/thank you letters in one week intervals. A total of 2,560 participants meeting eligibility criteria completed the questionnaire (including 2,201 hard-copy questionnaires for a response rate of 63% and 359 online). This analysis, N = 2,463, included those who self-identified as gay, lesbian, or bisexual, including transgender and nontransgender LGB older adults.

All measures included in the study are detailed in Table 1. Outcome variables are physical and mental health QOL. Explanatory variables are social risks (lifetime victimization and discrimination); identity management resources (positive sense of sexual identity, identity disclosure, time length of sexual identity disclosure); social resources

Table 1. Description of Measures

Variables	Descriptions
Outcome variables	
Physical and mental health QOL	We measure physical and mental health QOL using eight items from the SF-8 Health Survey (Ware, Kosinski, Dewey, & Gandek, 2001). The SF-8 Health Survey, a short version of SF-36, consists of two components: physical and mental health. The physical health component asks participants to rate their health over the previous four week period on physical functioning, limitations due to physical problems, bodily pain, and general health. The mental health component assesses vitality, social functioning and roles, and general mental health. The summary score for each component is standardized with a mean of 0 and a standard deviation of 1, with higher scores indicating better perceived physical (Cronbach's α = .89) and mental health QOL (Cronbach's α = .86).
Explanatory variables	
Social risks	Lifetime victimization and discrimination is measured using modified versions of the Lifetime Victimization Scale (D'Augelli & Grossman, 2001) and the Lifetime Discrimination Scale (Inter-University Consortium for Political and Social Research, 2010). Participants are asked how many times in their lives, because of their actual or perceived sexual and/or gender identity, they had experienced 16 different types of victimization and discrimination including physical, verbal or sexual threat or assault, threat of being outed, property damage, being hassled or ignored by police, job-related discrimination, being denied health care or receiving inferior health care, and being prevented from living in a neighborhood they wanted. A 4-point Likert scale was used, with summed score ranging from 0 to 46 (Cronbach's α = .86).
Identity management resources	Positive sense of sexual identity is measured with a modified version of the Homosexual Stigma Scale (Liu, Feng, & Rhodes, 2009). Participants rate to what extent they agree with five statements such as "I feel that being lesbian, gay, bisexual, or transgender is a personal shortcoming for me" and "I have tried to not be lesbian, gay, bisexual, or transgender." We reverse-coded the ratings. The summary score ranges from 1 to 4, with higher scores indicating more positive sense of sexual identity (Cronbach's α = .78). Identity disclosure is measured with a modified version of the Outness Inventory scale (Mohr & Fassinger, 2000). Participants were asked to what extent family members, a best friend, supervisor, neighbors, faith community, and primary physician know the participants' sexual and/or gender identity. A 4-point Likert scale is used, with summary scores ranging from 1 (definitely do not know) to 4 (definitely know), and Cronbach's α is .92. Time length of sexual identity disclosure is measured, as suggested by D'Augelli and Grossman (2001), by subtracting the age of sexual orientation awareness from the age of first disclosure and dividing by current age. We further subtracted the proportion from 1 in order to calculate the time proportion of sexual identity disclosure. The score ranged from .05 to 1 with higher scores indicating a longer time of disclosure.

Table 1. Continued

Variables	Descriptions
Social resources	Relationship status is dichotomized into being partnered or married (= 1) and not being partnered or married (= 0; including single, widowed, separated, and divorced). Social network size is determined by asking participants to report the number of people (e.g., friends, family members, colleagues, and neighbors) they have interacted within a typical month by sexual and gender identity (gay men, lesbians, bisexuals, transgender older adults, and heterosexuals) and age (age 50 and older or younger than 50). We sum the total size and coded by quartiles with 1 indicating lowest 25% (*small*) and 4 indicating highest 25% (*large*). Religious or spiritual activity is measured by the frequency of attending spiritual or religious services and activities in the last 30 days. The degree of social support is measured with the 4-item abbreviated Social Support Instrument (Sherbourne & Stewart, 1991). The summary score ranged from 1 to 4, with higher scores indicating greater social support (Cronbach's α = .85). We measure community connectedness by 2 items asking the extent participants have positive feeling of belonging to LGBT communities. The range is 1–4 with higher values indicating higher levels of perceived community connectedness.
Health-promoting behaviors	Physical activity is defined as being engaged, on a weekly basis, in at least moderate activities that cause increase in breathing or heart rate (CDC, 2011). To assess leisure activity, participants were asked how often in a week they were engaged in activities that do not cause increase in breathing or heart rate, such as reading, meditation, and drawing (Petry, Fredriksen-Goldsen, Kim, & Muraco, 2011). We assessed routine health check-up by asking whether, within the past year, participants visited a physician for a routine check-up defined as a general physical exam, not an exam for a specific injury, illness, or condition. Those not engaged in any of the following behaviors were coded as substance nonusers: Current smoking defined as having ever smoked 100 or more cigarettes and currently smoking every day or some days (CDC, 1994); excessive drinking defined as five or more drinks on one occasion during the past 30 days (Substance Abuse and Mental Health Services Administration, 2006); and, use of drugs other than those required for medical reasons.
Socioeconomic resources	Household income is dichotomized into ≤200% of federal poverty level (FPL) = 0 and > 200% FPL = 1 based on 2009 federal poverty guidelines (U.S. DHHS, 2012) and household size. Education level is dichotomized, ≤high school = 0 vs some college = 1. Employment is dichotomized, not employed = 0 vs employed = 1.
Background characteristics	Background characteristics include sexual identity (bisexual = 0; lesbian/gay = 1), gender (male = 0; female = 1); gender identity (nontransgender = 0; transgender = 1); race/ethnicity (non-Hispanic White = 0; Hispanic = 1; African American = 2; other = 3); geographic area (rural = 0; urban = 1); and number of chronic health conditions. To assess the number of chronic health conditions, participants were asked whether they had ever been told by a doctor that they had any of the following: high blood pressure, high cholesterol, heart attack, angina, stroke, cancer, arthritis, diabetes, asthma, or HIV/AIDS. The number of chronic health conditions was summed, with a range of 0–10.

Note: QOL = quality of life.

(relationship status, social network size, religious or spiritual activity, social support, and community connectedness); health-promoting behaviors (physical activity, leisure activity, routine health check-up, and substance nonuse); and socioeconomic resources (household income, education, and employment status) and other background characteristics (sexual identity, gender, gender identity, race/ethnicity, geographic area, and number of chronic health conditions).

Analyses

First, descriptive statistics and bivariate analysis are conducted to explore the distributions of the outcome and explanatory variables in the sample and across the three age groups. Second, multivariate linear regression is used to test the independent contributions of the explanatory variables on the outcome variables. Robust estimator is used to calculate standard errors for statistical inferences. In the first model (Model 1), we examine the association between age group and outcome variables, controlling for background characteristics. We add explanatory variables indicated in the hypotheses in the second model (Model 2). In the last model (Model 3), to test whether or not the relationship between explanatory variables and outcome variables differ by three age groups, we add interaction terms between selected variables and age group with the young–old age group as the reference group. Because there are three age groups, post hoc *F* tests are conducted to detect potential differences between middle–old and old–old age groups. Interaction terms that were at least marginally related to the outcome variables ($p < .1$) in the presence of other covariates or whose corresponding post hoc tests

reached .1 significance level, were retained in the model. To better manage potential issues of multicollinearity associated with interaction terms, all continuous variables were centered to 0 before they were entered to the model (West, Aiken, & Krull, 1996).

Multiple imputation (MI) techniques were applied to handle missing values across the analyses. Because MI requires the missing mechanism be at least missing at random (MAR), we first conducted a series of sensitivity analyses, as recommended by Carpenter , Kenward, and White (2007). The results showed that with 40 imputations the estimations were stable and robust in relation to the MAR assumption. Consistent with the

results of Monte Carlo error analysis, 40 imputations were adequate to provide stable and reproducible estimation results (White, Royston, & Wood, 2011). All the statistical computations were carried out with Stata 13 (StataCorp, 2013).

Results

The distribution of the background characteristics and explanatory variables by the three age groups is illustrated in Table 2. By age group, 44% are aged 50–64 (young–old age group), 46% are 65–79 (middle–old age group), and 10% are 80 and older (old–old age group). The three age groups are

Table 2. Sample Description of Background Characteristics and Key Study Variables by Age Groups

	Total sample (N = 2,463)	Age 50–64 young–old (N = 1,078)	Age 65–79 middle–old (N = 1,138)	Age 80 + old–old (N = 247)	χ^2 or *F* test
	M (*SE*) or %	*M* (*SE*) or %	*M* (*SE*) or %	*M* (*SE*) or %	*p*
Background characteristics					
Sexual identity					< .001
Gay/lesbian	92.940	91.370	94.640	91.900	
Bisexual	7.060	8.630	5.360	8.100	
Gender, female	36.480	44.200	32.420	21.460	<.001
Transgender	4.120	6.520	2.660	.400	<.001[a]
Race/ethnicity					.013[a]
White	86.850	84.790	87.360	93.500	
African American	3.430	4.200	3.090	1.630	
Hispanic	4.250	5.220	3.710	2.440	
Other	5.470	5.780	5.840	2.440	
Geographic area, urban	96.950	97.000	96.700	97.940	.588
Chronic conditions	1.945 (0.029)	1.642 (0.041)	2.164 (0.042)	2.259 (0.096)	<.000
Social risks					
Lifetime victimization and discrimination	6.406 (0.146)	7.404 (0.229)	6.067 (0.213)	3.608 (0.304)	<.000
Identity management resources					
Positive sense sexual identity	3.537 (0.011)	3.549 (0.017)	3.547 (0.017)	3.436 (0.040)	.014
Identity disclosure	3.487 (0.013)	3.622 (0.108)	3.435 (–0.085)	3.137 (–0.440)	<.001
Time length of disclosure	.897 (0.003)	.904 (0.005)	.896 (0.005)	.878 (0.014)	.103
Social resources					
Partnered or married	44.360	47.860	43.810	31.560	<.001
Social network size	2.492 (0.024)	2.556 (0.035)	2.474 (0.035)	2.294 (0.077)	.006
Religious activity	2.028 (0.095)	2.014 (0.137)	2.056 (0.142)	1.962 (0.301)	.948
Social support	3.103 (0.016)	3.123 (0.025)	3.102 (0.023)	3.016 (0.048)	.163
Community connectedness	3.420 (0.015)	3.468 (0.023)	3.413 (0.023)	3.240 (0.051)	<.001
Health-promoting behaviors					
Physical activity	85.220	86.750	85.920	75.210	<.001
Leisure activity	5.136 (0.050)	4.771 (0.073)	5.405 (0.068)	5.563 (0.149)	<.001
Routine health check-up	82.790	76.410	87.540	88.800	<.001
Substance nonuse	75.110	68.640	78.860	87.390	<.001
Socioeconomic resources					
Income, above 200% FPL	70.070	74.370	67.610	61.990	<.001
Employment	43.920	65.550	29.860	14.230	<.001
Education, ≥ some college	92.260	93.280	91.640	90.650	.215

Notes: FPL = federal poverty level.
[a]Using Fisher's exact test.

heterogeneous regarding their background characteristics, with the exception of urbanicity. The majority of the participants (93%) self-identify as gay or lesbian, although the middle–old age group shows a higher proportion of those gay or lesbian compared to the young–old and old–old age groups. The proportions of female, transgender adults, and racial and ethnic minorities are the highest for the young–old age group and the lowest for the old–old age group. On average, participants have two chronic health conditions with the young–old age group having the lowest number of chronic conditions.

In terms of social risks the participants, on average, report 6.5 lifetime victimization and discrimination events; the young–old age group shows the highest, and the oldest age group shows the lowest. Both the young–old and middle–old age groups report better identity management resources, with the old–old age group reporting the lowest levels of positive sense of sexual identity and disclosure. For social resources, the young–old age group is most likely to have a partner or spouse, combined with the highest levels of community connectedness and largest network size whereas the old–old age group reports the lowest. There were no significant differences in levels of religious or spiritual activity and social support by age group. In terms of health-promoting behaviors, the rates of physical activity for the young–old and middle–old groups are higher than that for the old–old age group. The middle–old and old–old age groups are more likely to be engaged in leisure activity and have a routine health check-up compared to the young–old age group. The old–old age group reports the highest rate of substance nonuse although the young–old age group reports the lowest. The young–old age group has the highest socioeconomic status and is more likely to have incomes above 200% of the FPL and be employed. We do not observe age group differences in education.

In Table 3 we present the results of multiple variable linear regressions of physical health QOL testing the study hypotheses. As shown in Model 1 (hypothesis a), age is significantly associated with physical health QOL, when controlling for background characteristics. The level of physical health QOL is similar between the young–old age group and the middle–old age group, and lowest for the old–old age group. In Model 2 (hypothesis b), the relationship between age and physical health QOL remains significant after controlling for other covariates. We observed significant predictors of physical health QOL, independent of age group effect. Physical health QOL is negatively associated with lifetime victimization and discrimination, and chronic health conditions and positively associated with social network size, social support, physical activity, leisure activity, substance nonuse, income, employment, and being male.

Next we test whether the influence of explanatory variables on the outcome variable differs by age group by adding interaction terms and coding the young–old group as the reference group (Table 3, Model 3; hypothesis c). For example, the regression coefficient for lifetime victimization and discrimination ($b = -.021$; $p < .01$) indicates negative influence of lifetime victimization and discrimination on physical health QOL for the young–old age group. The negative sign of regression coefficient for the interaction term, Age 80 × Lifetime victimization and discrimination ($b = -.020$; $p < .10$), indicates that the negative influence for the old–old age group is marginally significantly stronger when compared to the young–old age group. Further, the post hoc F test indicates that the negative effect of lifetime victimization and discrimination on physical health QOL for the old–old age group is also significantly stronger than the middle–old age group at the .05 level. Other interaction effects are also observed. Only the old–old age group shows a negative relationship between having a partner or spouse and physical health QOL. Employment has a stronger positive influence on physical health QOL for the young–old age group compared to the middle–old age group. Unlike the younger groups, education has a positive influence for the old–old age group.

The same regression models are applied to mental health QOL to test the study hypotheses (Table 4). As shown in Model 1 (hypothesis a), the level of mental health QOL is highest for the middle–old and similar between the young–old age group and the old–old age group. In Model 2 (hypothesis b), the relationship between age and mental health QOL remains at a similar level, even after controlling for other explanatory variables. In the model, mental health QOL is negatively associated with lifetime victimization and discrimination, identity disclosure, and chronic health conditions, after controlling for age group and other explanatory variables. Mental health QOL was positively associated with positive sense of sexual identity, social network size, social support, physical activity, leisure activity, routine health check-up, substance nonuse, income, employment, being male, and transgender identity.

In Model 3 (hypothesis c), we test the interaction effects between age group and explanatory variables on mental health QOL. The negative influence of lifetime victimization and discrimination for the young–old and old–old age group are stronger than that for the middle–old age group. The positive influence of higher levels of education and the negative influence of being partnered or married on mental health QOL are observed only for the old–old age group. The positive influence of employment for the young–old age group is stronger than that

Table 3. The Results of Linear Regression of Age Group and Key Study Variables on Physical Health QOL

	Physical health QOL					
	Model 1		Model 2		Model 3	
	β	SE	β	SE	β	SE
Background characteristics						
Age						
50–64	(Ref)		(Ref)		(Ref)	
65–79	.027	0.040	.056	0.042	.281†	0.158
80 and older	−.213**	0.066	−.142*	0.068	−.371	0.240
Sexual identity						
Gay/lesbian	(Ref)		(Ref)		(Ref)	
Bisexual	.095	0.079	.034	0.071	.009	0.072
Gender, female	−.213**	0.039	−.326**	0.038	−.324**	0.038
Transgender	−.075	0.111	.122	0.108	.110	0.108
Race/ethnicity						
White	(Ref)		(Ref)		(Ref)	
African American	−.028	0.104	.011	0.096	.027	0.094
Hispanic	−.121	0.079	−.001	0.075	−.007	0.074
Others	−.104	0.097	−.026	0.092	−.025	0.092
Geographic area, urban	.052	0.111	.046	0.105	.04	0.106
Chronic conditions	−.281**	0.012	−.222**	0.013	−.219**	0.013
Social risks						
Lifetime victimization and discrimination			−.020**	0.003	−.021**	0.004
Identity management resources						
Positive sense sexual identity			.058	0.038	.059	0.038
Identity disclosure			−.043	0.031	−.034	0.031
Time length of disclosure			−.159	0.100	−.160	0.102
Social resources						
Partnered or married			−.005	0.042	.079	0.057
Social network size			.044*	0.018	.041*	0.018
Religious activity			−.004	0.004	−.005	0.004
Social support			.070*	0.030	.067*	0.030
Community connectedness			.024	0.027	.026	0.027
Health-promoting behaviors						
Physical activity			.420**	0.056	.424**	0.056
Leisure activity			.017*	0.008	.016†	0.008
Routine health check-up			.063	0.049	.063	0.049
Substance nonuse			.087*	0.041	.086*	0.041
Socioeconomic resources						
Income, above 200% FPL			.239**	0.045	.225**	0.045
Employment			.266**	0.040	.376**	0.061
Education, ≥ some college			.090	0.079	.072	0.111
Interaction terms						
Age 65–79 × Lifetime victimization and discrimination					.004	0.005
Age 80 × Lifetime victimization and discrimination					−.020†[*]	0.012
Age 65–79 × Partnered or married					−.106	0.073
Age 80 × Partnered or married					−.385**[*]	0.125
Age 65–79 × Employment					−.202*	0.082
Age 80 × Employment					−.198	0.177
Age 65–79 × Some college					−.079	0.158
Age 80 × Some college					.421†[*]	0.246

Notes: FPL = federal poverty level; QOL = quality of life.

† < .1; * < .05; ** < .01; [.] represented the comparisons between middle–old and old–old using post hoc *F* test.

for the middle–old age group, although the positive influence of substance nonuse is stronger for the young–old and middle–old age groups. The middle–old age group is more likely to be influenced by routine health check-up and chronic conditions compared to the young–old age group.

Table 4. The Results of Linear Regression of Age Group and Key Study Variables on Mental Health QOL

	Mental health QOL					
	Model 1		Model 2		Model 3	
	β	SE	β	SE	β	SE
Background characteristics						
Age						
50–64	(Ref)		(Ref)		(Ref)	
65–79	.168**	0.042	.153**	0.040	.167	0.175
80 and older	.055	0.068	.074	0.067	–.079	0.340
Sexual identity						
Gay/lesbian	(Ref)		(Ref)		(Ref)	
Bisexual	.210*	0.089	.084	0.075	.067	0.076
Gender, female	–.029	0.041	–.217**	0.037	–.219**	0.037
Transgender	–.081	0.111	.168†	0.093	.178†	0.093
Race/ethnicity						
White	(Ref)		(Ref)		(Ref)	
African American	.055	0.107	.112	0.091	.118	0.090
Hispanic	–.287**	0.090	–.092	0.081	–.114	0.081
Others	–.235**	0.101	–.102	0.088	–.123	0.086
Geographic area, urban	.035	0.107	.075	0.099	.076	0.099
Chronic conditions	–.183**	0.014	–.117**	0.013	–.095**	0.020
Social risks						
Lifetime victimization and discrimination			–.021**	0.003	–.027**	0.004
Identity management resources						
Positive sense sexual identity			.144**	0.038	.143**	0.039
Identity disclosure			–.076*	0.030	–.071*	0.030
Time length of disclosure			–.021	0.110	–.025	0.111
Social resources						
Partnered or married			–.012	0.041	.031	0.056
Social network size			.104**	0.018	.100**	0.018
Religious activity			–.002	0.004	–.003	0.004
Social support			.256**	0.030	.254**	0.031
Community connectedness			.042	0.028	.045	0.027
Health promoting behaviors						
Physical activity			.355**	0.052	.366**	0.052
Leisure activity			.030**	0.008	.028**	0.008
Routine health check-up			.089†	0.049	–.024	0.060
Substance nonuse			.182**	0.041	.235**	0.057
Socioeconomic resources						
Income, above 200% FPL			.295**	0.044	.273**	0.044
Employment			.223**	0.039	.362**	0.061
Education, ≥ some college			–.038	0.069	–.062	0.097
Interaction terms						
Age 65–79 × Chronic health conditions					–.043†	0.027
Age 80 × Chronic health conditions					.023	0.043
Age 65–79 × Lifetime victimization and discrimination					.016**	0.006
Age 80 × Lifetime victimization and discrimination					–.10[*]	0.011
Age 65–79 × Partnered or married					–.046	0.072
Age 80 × Partnered or married					–.242*[†]	0.122
Age 65–79 × Routine health check-up					.233*	0.105
Age 80 × Routine health check-up					.297	0.203
Age 65–79 × Substance nonuse					–.054	0.085
Age 80 × Substance nonuse					–.406*[†]	0.194

Table 4. Continued

| | Mental health QOL | | | | | |
| | Model 1 | | Model 2 | | Model 3 | |
	β	SE	β	SE	β	SE
Age 65–79 × Employment					−.275**	0.082
Age 80 × Employment					−.102	0.161
Age 65–79 × Some college					−.011	0.143
Age 80 × Some college					.336[†][††]	0.206

Notes: FPL = federal poverty level; QOL = quality of life.

[†] < .1; * < .05; ** < .01; [.] represented the comparisons between middle–old and the old–old group using post hoc *F* test.

Discussion

Although considerable research has been conducted on successful aging in general, successful aging has rarely been studied in diverse and hard-to-reach populations. Based on a multidimensional Resilience Framework, this study examines predictors of physical and mental health QOL as a subjective evaluation of successful aging, and also investigates age group differences among LGBT older adults. Although the levels of health-related QOL differ by age groups (hypothesis a), explanatory factors specified in the resilience framework, which are social risks, identity management and social resources, health-promoting behaviors, and socioeconomic resources, are significantly associated with physical and mental health QOL, independent of age group effect, and other correlates (hypothesis b). In addition, the hypothesis that the influence of the explanatory factors on physical and mental health QOL differ by age groups is partially supported (hypothesis c).

These findings support existing literature on the interconnections between successful aging, physical and mental health and functioning, and social connectedness, while also contextualizing unique experiences of LGBT older adults including a positive sense of sexual identity and experiences of lifetime victimization and discrimination. The relationships between components in the Resilience Framework identified in this paper highlight deeply imbedded and potentially similar social processes that may be shared by other minority populations, such as racial and ethnic minorities and people with disabilities, including those living with HIV, and others.

To date, most studies of LGBT aging and health have relied on the experiences of young–old adults. This is the first large study with the majority of LGBT participants over the age of 60, including a sizeable group aged 80 years and older. Age group was significantly associated with physical and mental health QOL as hypothesized (hypothesis a). The younger age groups in this study report better physical health QOL consistent with studies of older adults in the general community (Luo et al., 2012). The middle–old age group is more likely to have better mental health QOL than the young–old and old–old age groups, again consistent with previous studies in the general adult population, documenting mental health QOL increasing up through the middle–old age group and declining in old–old age (Corona et al., 2010). Deterioration of health-related QOL among old–old age group is related in part to biological frailty (Luo et al., 2012). As Romo and Colleagues (2012) suggest, older adults, particularly those with functional dependence, often maintain a feeling of successful aging despite limitations in activities of daily living. Subsequently we discuss resilience-related explanatory factors that are important to consider in the assessment of successful aging among LGBT older adults (hypothesis b); and we also highlight age group differences in the influence of the explanatory factors on physical and mental health QOL (hypothesis c).

The hypothesis that explanatory factors (social risks, identity management resources, social resources, health-promoting behaviors, and socioeconomic resources) in the Resilience Framework would uniquely predict both physical and mental health QOL was partially supported. The association of lifetime victimization and discrimination with physical and mental difficulties among LGBT older adults has been found in earlier studies to predict poor health outcomes (Fredriksen-Goldsen, Emlet, et al., 2013). In this study the influence of lifetime victimization and discrimination on physical and mental health QOL is consistently observed in this study. Interestingly, we find that the influence of lifetime victimization and discrimination on physical and mental health QOL was particularly strong among the old–old age group, even though this group experienced the fewest number of these lifetime events. It may be that the relationship between lifetime victimization and discrimination and health-related QOL is related to the larger social context and has a differential impact depending on the sociohistorical environment in which LGBT people came of age and lived.

The LGBT older adult participants in the young–old group came of age in the 1970s when the modern gay movement emerged, with an emphasis on identity disclosure and "coming out of the closet" as a new way of life and valuable political praxis. For the old–old age group, concealing their sexual and gender identities seems to have been protective and in fact may have resulted in lower rates of lifetime victimization and discrimination, a function of the realities of the historical time, including laws that criminalized same-sex sexual behavior. Yet, these protective mechanisms may have simultaneously heightened their vulnerability to the potential negative consequences of victimization and discrimination. Although this cross-sectional study reveals age group differences, longitudinal research is needed to investigate such potential age, period, and cohort effects.

In terms of identity management resources in the Resilience Framework, a positive sense of sexual identity is associated with better mental health QOL. It has been documented that positive self-evaluation of sexual identity is associated with better mental health among sexual minority individuals (Hatzenbuehler, Phelan & Link, 2013; Meyer, 2003). Interestingly, sexual identity disclosure is negatively associated with mental health QOL after controlling for other correlates in the Resilience Framework. Disclosing sexual identities have been known to provide the opportunities for building social support and relational ties that can buffer the negative consequences of adverse experiences and promote mental health QOL (Meyer, 2003). Our additional analyses indicate that the direction of the relationship between disclosure and mental health QOL changed from positive to negative after controlling for social support and relationship status. Further research is needed to more clearly explicate the role of social relations in the association between sexual identity disclosure and mental health QOL.

Johnson and Mutchler (2013) have identified families and communities as important components of successful aging. As hypothesized, the social resources in the Resilience Framework, social network size and social support, are significant explanatory factors for both physical and mental health QOL regardless of age group. In the general population, social network size diminishes with aging even though strong ties with family and other close friends are maintained (Cornwell, Laumann, & Schumm, 2008). This study shows a similar pattern in terms of social network size, but the social relations and social network types may differ for LGBT older adults as their social relationships are more peer-oriented and they are less likely to be married or partnered and less likely to have children compared to heterosexuals of similar age (Fredriksen-Goldsen, Kim, et al., 2013).

The lower levels of social network size and community connectedness are of particular concern for the old–old LGBT age group. LGBT individuals in the old–old age group rely more heavily on peer-based support than older adults of comparable age in the general population, which may dwindle with aging due to death, relocation, and impairment of peers. This may place the LGBT old–old, the long-term survivors, at serious risk of social isolation, which in the general population has been linked to poor mental and physical health, higher levels of cognitive impairment, and premature disease and death (Ailshire & Crimmins, 2011). Although it is common for social network size to diminish over time in old age, Johnson and Mutchler (2013) remind us that positive and successful aging can be enhanced through modifiable factors such as social participation, as suggested in the model of successful aging by Rowe and Kahn (1998). Religious and spiritual activities are not associated with health-related QOL in this study. Although more research is needed it may be that many LGBT older adults have a complex and at times tenuous and conflicted relationship with religious and spiritual activities given both historical as well as contemporary tensions that have often existed between religious doctrines and institutions and homosexuality (Valentine & Waite, 2012).

Having a partner or spouse as a social resource has been found to be linked to better physical and mental health outcomes among LGBT older adults (Fredriksen-Goldsen, Emlet, et al., 2013; Williams & Fredriksen-Goldsen, 2014). Yet, interestingly, we find that having a partner or spouse is negatively associated with physical and mental health QOL among the old–old age group, after controlling for other explanatory variables. Perhaps this negative association is reflective of a survival effect because mortality rate may be higher for those without a partner or spouse (Johnson, Backlund, Sorlie, & Loveless, 2000). LGBT older adults who have a partner or spouse may be able to live longer into old age, even when they have health conditions requiring intimate support in the household. In addition they may be reluctant to utilize formal aging and support services due to experiences of cultural insensitively or discrimination against sexual minorities and same-sex couples in service settings.

Among the older adults in this study, like those in the general population, health-promoting behaviors, including physical activity, leisure activity, and substance nonuse, are related to better physical and mental health QOL across all age groups, as predicted by our Resilience Framework. The lack of physical activity and smoking has been found in previous research to be associated with health problems, including depression and disability in this population (Fredriksen-Goldsen, Emlet, et al., 2013). This study

extends earlier work by investigating the association of leisure activity as a potential health-promoting behavior among LGBT older adults, consistent with other studies of older adults in the general population (Hutchinson, Bland, & Kleiber, 2008). Although leisure activities among LGBT populations have rarely been included in empirical studies, it has been suggested by Iwasaki and Ristock (2004), that leisure space is considered an "oasis" for gays and lesbians that "re-charge[s] themselves physically, emotionally, and psychologically" and "facilitates a sense of empowerment to proactively cope with stress in a world where homophobia and heterosexism still exist."

The result of interaction effect analyses indicates that substance use has the strongest association to QOL among the young–old and middle–old age groups. Our findings also suggest that mental health QOL, but not physical health QOL, is associated with routine health check-up even after controlling for chronic health conditions and other correlates, which might be due to the fact that those who have better mental health are more likely to engage in preventative self-care behaviors. We also found that the influence of a routine health check-up and chronic conditions on mental health QOL are more salient among those in the middle–old group. Such findings suggest that more attention must be paid to promoting positive health behaviors for successful aging among LGBT older adults. Interventions need to be initiated for those at risk, including the young–old or earlier, to reduce the likelihood of diminished physical and mental health QOL, which may further complicate health and the prevention and care of chronic and other health conditions.

In terms of socioeconomic status, income and employment are positively associated with both physical and mental health QOL whereas education is not, which is consistent with previous studies that suggest income is a stronger predictor of health-related QOL than education among older adults in the general population (Robert et al., 2009). Although LGB older adults report higher education, they have similar incomes compared to the general older adult population (Fredriksen-Goldsen, Kim, et al., 2013); thus, for LGBT older adults education may not result in the same type of opportunities and they may experience income discrimination, which are obstacles for successful aging as suggested in this study. Interestingly, we do not observe differences in education between the three age groups, even though in the general population the old–old have lower levels of education. Educational attainment may have been a protective factor for the LGBT old–old in securing a place in society. These older adults may have sought educational opportunities in order to maintain financial independence. Contrary to gender norms at the time, older lesbian and bisexual women may have been aware at an early age of the need of an education to support themselves financially. Further research is needed to examine whether the potential cumulative effect of education on health-related QOL gets stronger with age in these populations.

The levels of physical and mental health QOL for women in this study are lower than those for men. Whereas a previous study observed no gender differences in mental health among LGB older adults (Grossman, D'Augelli, & O'Connell, 2002), other studies of older adults in the general population find a similar pattern (Orfila et al., 2006; Pinquart & Sorensen, 2001). Although we observe a significant difference in mental health QOL among Hispanics compared to White LGBT older adults, they are largely explained by differences in access to resources and risks identified in this research. When controlling for both resources and risks, transgender identity is associated with better mental health QOL even though, at a bivariate level, transgender older adults report a lower level of mental health QOL than nontransgender LGB older adults. Previous research has found that transgender older adults are at higher risk of poor health outcomes, linked to elevated levels of stress and victimization and discrimination, as well as reduced access to health care, and limited physical activity and social support, compared to nontransgender older adults (Fredriksen-Goldsen, Cook-Daniels, et al., 2014). Additional research is needed to more closely investigate ways in which differences in QOL and health by background characteristics among LGBT older adults, such as race and ethnicity, biological sex, and gender roles and identity, are explained by advantages and disadvantages in resources associated with social statuses.

Although this is one of the first studies to examine physical and mental health QOL and age group differences among LGBT older adults, the results need to be interpreted in the context of the limitations of the study. Further research that includes the subjective assessment of successful aging in this population is needed. For example, Romo and colleagues (2012) found that many older adults achieve successful aging by focusing on life successes rather than physical and economic status. Furthermore, although this is the first study to assess the experiences of LGBT adults 80 and older, the sample sizes of the younger age groups are larger, which may lead to more conservative estimates between the outcomes and the explanatory factors for this age group. In addition, this study utilized a community-based approach to recruit a demographically diverse sample, but it is not a probability-based sample thus the findings are not generalizable. Furthermore, this study cannot differentiate age, period, and cohort effects. Thus, the next step in this research is to conduct a longitudinal study of LGBT aging and health to differentiate

cohort, period, and age effects to better understand health and aging trajectories over time in this population.

Conclusion

Investigating the physical and mental QOL of LGBT older adults by age group is an important first step to better understand successful aging in this understudied population. Models of successful aging clearly acknowledge the importance of identifying modifiable factors to promote the health and well-being of older adults. The findings of this study underscore the importance utilizing a Resilience Framework for understanding the differing configurations of key resources and risks of LGBT older adults by age group. It is critical to fully investigate factors leading to good health in this population if we are to develop balanced and tailored interventions that support the strengths as well as challenges facing LGBT older adults.

Funding

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