



Social participation and memory of aging sexual minority people: the Canadian Longitudinal Study on Aging

Wook Yang, PhD^{a,*}, Shelley L. Craig, PhD^b, Carles Muntaner, PhD^c

^a Rongxiang Xu College of Health and Human Services, California State University, Los Angeles, 5151 State University Drive, Los Angeles, California, USA 90032

^b Canada Research Chair in Sexual and Gender Minority Youth & Professor, Factor-Inwentash Faculty of Social Work, University of Toronto, 246 Bloor Street West, Toronto, Ontario, Canada M5S 1V4

^c Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, 155 College Street, Toronto, Ontario, Canada M5T 3M7



ARTICLE INFO

Article history:

Received 8 November 2024

Received in revised form 20 October 2025

Accepted 5 January 2026

Available online xxx

Keywords:

CLSA

Memory

Sexual minority

Social participation

ABSTRACT

In order to expand Meyer's Minority Stress Theory, the current study investigated the relationship between sexual minority status and memory while considering the influence of social participation. By using multiple regression, a secondary data source from the Canadian Longitudinal Study on Aging was utilized to examine whether social participation would serve as a significant mediator between sexual minority status and memory performance among aging adults. The study revealed that social participation acts as a significant mediator for aging sexual minority men, but not for aging sexual minority women for their cognitive performance. When social participation was added to the regression model, aging sexual minority men's memory performance was at a lower level compared to their non-sexual minority counterparts. The current study points to the importance of social participation as an area of further exploration when investigating the relationship between sexual minority status and cognitive health in older adults.

© 2026 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Guided by the Minority Stress Theory (MST)^{1,2} the current research presents the opportunity to widen a set of potential constructs that could be considered in sexual minority aging research by introducing social participation and memory. The MST has been previously used for research studies that focused on a wide variety of mental health outcomes such as depression and suicide.^{3,4} Mental health inequities between aging sexual minority and non-sexual minority people have been reported,^{5,6} but cognitive health is another critical health outcome to be better understood in order to identify the needs of sexual minority population's aging process. While existing gerontology literature has examined the role of social participation and cognition in the general aging population, it is important for us to understand how these mechanisms influence health and well-being of aging sexual minority adults. Cognition is an important domain of health in sexual minority aging and it needs to be further investigate because we need to understand challenges that aging sexual minority people face due to the combination of heterosexism and ageism that can contribute to their cognitive performances in late adulthood.^{7,8} However, cognition is not often discussed by

scholars that are utilizing the MST. Although MST does not consider cognitive function as an outcome of interest, chronic stress and its physiological impact on brain suggests that cognitive health could be explored through the MST model.⁸ By utilizing the MST model to investigate social participation and memory as potential contributing factors of sexual minority health through the use of the Canadian Longitudinal Study on Aging (CLSA) data, the model can be further diversified in order to be more applicable to aging sexual minority populations.

Social Participation

The MST model⁹ does not outline social participation as one of the ameliorating factors for sexual minority health outcomes, but it suggests that social support is important. Social support such as perceived emotional and informational support have been identified as a positive contributor for sexual minority aging.^{5, 10} However, differentiating social support from social participation is necessary because the amount of people's social support can be different from the level of social activities that they participate in. Therefore, the current study considers social participation as a separate construct to suggest that it can be an ameliorating factor that can be examined in addition to social support when utilizing the MST.

There has been some research on the impact of social participation in the general sexual minority population such as mental health

*Corresponding author.

E-mail addresses: Wyang27@calstatela.edu (W. Yang), shelley.craig@utoronto.ca (S.L. Craig), carles.muntaner@utoronto.ca (C. Muntaner).

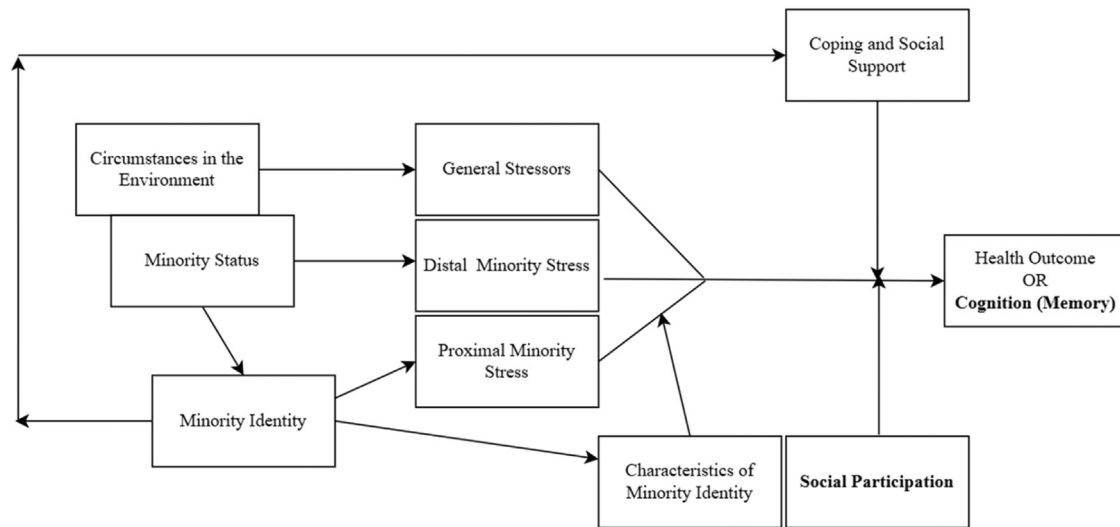


Fig. 1. Minority Stress Model with Suggested Variables from the Current Study in Bold (Adapted)

benefits on minority youth getting involved in gender-sexuality alliances as well as reduction of social isolation in sexual minority adults through sport and creative activities in affirmative environments,^{11,12} yet the literature provides little insights on social participation in aging sexual minority populations. Therefore, we need to have a deeper understanding of how social participation contributes to sexual minority people's aging in order to observe the benefits.

Cognition

Many studies have utilized MST to examine mental, physical, and sexual health disparities in sexual minority research.^{13–15} However, cognition is yet to receive a substantial amount of attention and more studies are needed to explore this construct as a health outcome in sexual minority research.⁸ Some studies have utilized MST as a guide to explore sexual minority aging and cognition. Brown and Patterson¹⁶ used the MST model to formulate their hypothesis to see whether cognitive disparities exist and found no differences between aging sexual minorities and non-sexual minority adults, whereas Stinchcombe and Hammond¹⁷ focused on the impact of minority stress on cognition and found that aging sexual minorities reported higher cognitive scores compared to non-sexual minority aging adults. Hence, more research is needed to better understand the potential application of the MST model in cognition and aging. This is particularly important for aging sexual minority research because results from recent studies are not consistent.^{7,17,18} Thus, the current research aims to add to the body of literature by providing additional insights into sexual minority aging and memory.

Theoretical framework

Mental health risk associated with stressors that are unique to sexual minority people was originally introduced by Dr. Virginia Brooks to highlight the different set of experiences that sexual minority women experience compared to non-sexual minority women due to prejudice and discrimination that stems from homophobia.^{1,9} Informed by Brooks' theory, Meyer proposed a model with key variables that could be operationalized through empirical research to understand the effect of minority stress on mental health outcomes of sexual minority people.^{2,9} The MST model outlines three key concepts: minority people experience unique types of stress that originate from their minority identity, which adds on top of general

stressors that non-minority people also experience; minority stress is chronic since social and cultural structures are at play; and minority stress has a social influence because of broader social forces that produce stressors beyond individual level.⁹ Although MST model can be utilized for a variety of minority populations such as gender and racial minorities, Meyer⁹ applied his model to demonstrate the impact of minority stress specifically rooted in the lesbian, gay, and bisexual population.

Two forms of minority stressors are highlighted in the model: distal and proximal. Distal stressors refer to prejudicial experiences and other negative events based on sexual orientation whereas proximal stressors refer to internal processes such as internalized stigmatization of minority identity as well as identity concealment.⁹ Such stressors can be mediated by social support at interpersonal and community levels, which can include family, friends, and queer-affirmative environments. The concept of minority coping is also introduced in Meyer's paper and the conceptualization of the term is related to group-level resources that can minimize the impact of stigma related to minority status.⁹ Minority status and facing hardships due to minority person's identity also can result in coping skills and resilience.^{9,19,20}

As identified in the MST model, coping and social support are proposed to be modifying factors between minority identity and mental health outcomes. Considering social participation as part of the MST model would allow further understanding of how engaging in social activities influences sexual minority people's health and well-being, while differentiating it from existing variables in the model such as social support. Hence, the current study explores how MST can be used to explore sexual minority aging by examining social participation level and its influence on memory (see Fig. 1).

Method

The MST^{1,2} indicates that sexual minority people are vulnerable to minority stressors that stem from their sexual orientation, which impact their mental health outcomes. Would cognition similarly be impacted? This study hypothesized that aging sexual minority people will show lower memory performance compared to their non-sexual minority peers, given the established relationship between stress and cognition. Additionally, the MST model includes social support as a protective factor in the relationship between sexual orientation and health outcomes.² The current research introduced social participation as another potential protective factor. Hence, this study

Table 1
Demographic information.

	Non-Sexual Minority Women (n=9647)	Sexual Minority Women (n=125)	Non-Sexual Minority Men (n=9133)	Sexual Minority Men (n=234)
Age, M(SE)	63.15 (.11)	58.78 (.85)	63.06 (.11)	59.59 (.60)
Education, n(%)				
Less than secondary	895 (9.30)	6 (4.80)	859 (9.40)	11 (4.70)
Secondary graduation, no postsecondary	1420 (14.70)	17 (13.60)	1174 (12.90)	28 (12.00)
Some postsecondary	730 (7.60)	12 (9.60)	694 (7.60)	20 (8.50)
Postsecondary degree/diploma	6602 (68.40)	90 (72.00)	6406 (70.10)	175 (74.80)
Social Participation, M(SE)**	29.54 (.05)	10.71 (.45)	10.56 (.05)	9.90 (.30)

hypothesizes that social participation will serve as a significant mediator in the relationship between sexual orientation and memory. Significant mediation effects of social participation would suggest that it is necessary to also consider social participation in sexual minority health research.

Sample

The Canadian Longitudinal Study on Aging (CLSA) was used for this study. The CLSA questionnaire has been collecting data from the aging population from 2010 and the data collection process will conclude in 2033.²¹ The data collection process was facilitated by the CLSA and our research team was able to access the data through an application process in order to conduct secondary data analyses. The baseline data, collected between 2011 and 2015 through telephone, was used for the current study's analyses. The age of respondents for this questionnaire ranged from 44 to 89. 253 gay/lesbian, 106 bisexual, and 19,780 non-sexual minority adults were included in our analysis with a mean age of 62.70 for aging women and 62.97 for aging men (see Table 1). 1,102 respondents were removed due to one or more missing variables regarding their sexual orientation, education level, or social participation score.

Measures

Sexual orientation

Self-reported sexual orientation with five different options were presented to each participant through the CLSA questionnaire: heterosexual, homosexual, bisexual, don't know, and refused. Respondents that selected "don't know" or "refused" were removed from the analyses.

Covariates

Age and education were considered in each model as covariates in the analyses. Respondents reported their birth year and their age. Aging has been studied extensively in relation to memory by establishing the link between brain's physical aging process and cognitive decline.^{22,23} Hence, accounting for respondents' age would be important for our analyses. Also, previous studies have indicated that higher educational attainment positively contributes to memory in late adulthood.^{24,25} For education, respondents' education levels were categorized into: less than secondary school; graduated secondary school; some post-secondary education; post-secondary degree/diploma.

Social participation

Based on Harasemiw and colleagues' approach,²⁶ social participation score was calculated by adding eight different activities: education or cultural; club or organization; neighborhood; volunteer; outing; sports; religious; and other recreational activities. The frequency of each activity was scored as: 0 (never), 1 (once a year), 2

(once a month), 3 (once a week), and 4 (once a day). The maximum possible score for social participation is 32. Previous studies that utilized the CLSA's social participation measure have reported Cronbach's alpha of 0.80 and above, which shows a high level of internal consistency.^{26,27}

Cognition

The Rey Auditory Verbal Learning Test (RAVLT)²⁸ measures memory by observing how many words the participants can learn and retain. The study utilized the recall score, which ranges from 0 to 15. A study that examined the validity of this measure by using the Benton Visual Retention Test (BVRT) and the Trail Making Test (TMT) reported that "RAVLT positively correlates with the visual memory evaluated by BVRT but does not correspond to the executive functions assessed by the TMT" (p. 129).²⁹ This study shows that RAVLT captures memory functions. By conducting test-retest analysis, the study also found that RAVLT has a good level of internal consistency.²⁹

Analysis plan

The PROCESS package of SPSS³⁰ was used to conduct mediation analyses. Each model had the social participation score as a mediator. Memory was the outcome variable in each analysis. Each analysis controlled for age and education.

The current study examined the mediation effects of social participation between aging sexual minority and non-sexual minority adults with 10,000 bootstrap samples for each model. Deng and colleagues³¹ reported that an analysis with a large sample size would need 500 or more bootstrapping to establish a statistical significance. Using Hayes' insights on regression models, each model of our study utilized 10,000 bootstrap samples.^{30,32} Gender stratification was used in each model based on past population-based studies that reported health outcomes of sexual minority people by differentiating the experience of sexual minority women and men.^{7,33} Gender stratification is an important step given that previous population-based studies have found different aging experiences in sexual minority groups for each gender.^{5,6}

Results

With social participation as a mediator in the model, direct effect of sexual minority identity on memory was not statistically significant for aging men ($\beta = 0.225$, 95% CI [-0.065, 0.516]). However, indirect effect of sexual minority status via social participation was observed between aging sexual minority and non-sexual minority men ($\beta = -0.035$, 95% CI [-0.065, -0.006]). This reflects that aging sexual minority men's lower levels of social participation negatively impact their memory when compared to their non-sexual minority peers (see Table 2). Total effects did not show any significant effect: $\beta = 0.191$, 95% CI [-0.101, 0.482].

Table 2

Model coefficients for memory with social participation as a mediator, men.

Antecedent		Consequent						
		M (Social Participation)			Y (Memory)			p
		Coeff.	SE	p	Coeff.	SE		
X_1 (Sexual Minority)	a	-.706	0.313	0.024	c'	0.225	0.148	0.128
M					b	0.049	0.005	<0.001
C_1 (Age)	f_1	0.0195	0.005	<0.001	g_1	-.053	0.002	<0.001
C_2 (Education)	f_2	0.767	0.048	<0.001	g_2	0.306	0.023	<0.001
Constant	i_M	7.434	0.488	<0.001	i_Y	5.233	0.234	<0.001
		$R^2=0.027$				$R^2=0.098$		
		$F(3, 9363)=87.642, p<0.001$				$F(4, 9362)=254.969, p<0.001$		

Table 3

Model coefficients for memory with social participation as a mediator, women.

Antecedent		Consequent						
		M (Social Participation)			Y (Memory)			p
		Coeff.	SE	p	Coeff.	SE		
X (Sexual Minority)	a	-.248	0.423	0.558	c'	-.059	0.230	0.798
M					b	0.056	0.006	<0.001
C_1 (Age)	f_1	0.044	0.005	<0.001	g_1	-.049	0.003	<0.001
C_2 (Education)	f_2	0.909	0.047	<0.001	g_2	0.246	0.026	<0.001
Constant	i_M	5.460	0.562	<0.001	i_Y	6.702	0.307	<0.001
		$R^2=0.041$				$R^2=0.067$		
		$F(3, 9768)=140.250, p<0.001$				$F(4, 9767)=174.503, p<0.001$		

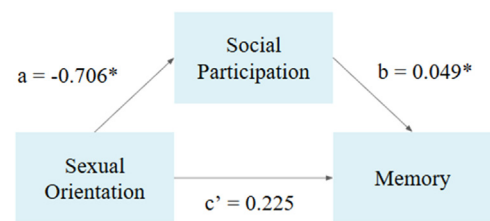
For aging women with social participation as a mediator in the model, direct effect of sexual minority identity on memory was not statistically significant ($\beta = -0.059$, 95% CI [-0.509, 0.391]). In addition, indirect effect of sexual minority status via social participation was not observed between aging sexual minority and non-sexual minority women ($\beta = -0.014$, 95% CI [-0.064, 0.036]). This indicates that aging sexual minority women's social participation level does not impact their memory when compared to non-sexual minority women (see Table 3). Total effects did not show any significant effect: $\beta = -0.073$, 95% CI [-0.526, 0.380].

Discussion

The current study showed that aging sexual minority men report lower levels of memory function compared to aging non-sexual minority men when considering the influence of social participation. Corro and Nielson⁸ posit that minority stress would contribute to sexual minority people's cognition in later development from prolonged social stigma through medicalization and criminalization of homosexuality. The current study also supports this since the indirect effect suggests that sexual minority men show lower memory capacity when compared to their non-sexual minority counterparts due to their lower levels of social participation (see Fig. 2). In addition, aging women did not demonstrate any significant differences in relation to their memory performance (see Fig. 3). Our results were unexpected since previous studies that explored sexual minority women's health have showed that they reported poorer health outcomes compared to non-sexual minority women.^{34,35}

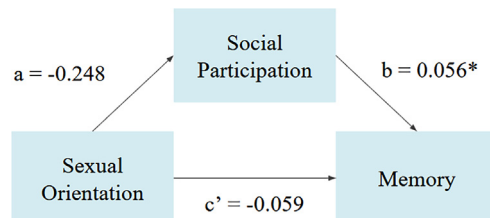
The current study emphasizes the need for cognition to be treated as a key potential health outcome in studies that incorporate the MST model. Previously, Brown and Patterson¹⁶ built their hypothesis by using the MST model as a guide to explore the subjective cognitive decline of sexual minority people and reported that the MST model may not be a suitable lens to use when investigating cognitive outcomes of sexual minority people. Also, Perales-Puchalt and

colleagues³⁶ indicated a similar view because they did not find a significant difference in risk of cognitive impairment between older adults with same-sex partners and opposite-sex partners. Since these studies were produced in the United States, efforts to observe cognitive outcomes in aging sexual minority populations in countries with different degree of policy protections and timelines of policy changes would provide valuable insights regarding the impact of minority stress on cognitive health in later adulthood.

**Fig. 2.** Mediation Model (Aging Men).

An indirect effect (ab) showing a statistically significant result of sexual minority status on memory via social participation. Direct effect (c') not statistically significant.

* Indicates a statistical significance ($p < 0.05$).

**Fig. 3.** Mediation Model (Aging Women).

No direct (c') or indirect (ab) effects were found.

* Indicates a statistical significance ($p < 0.05$).

Despite our interesting findings, the current studies have some limitations. The range of aging adults in this study included people in their middle adulthood because the sample included adults in their 40's. The World Health Organization³⁷ considers people that are 60 and up to be considered in the older adult group. Given the longitudinal nature of the CLSA questionnaire, revisiting this topic with the CLSA data with future waves would naturally include more older sample.

Conclusion

The current study adds to the existing literature regarding the relationship between social participation and memory. Previous studies have found increased social participation can positively influence cognitive aging in late adulthood.^{38,39} Paolini and colleagues⁴⁰ reported that social exclusion that sexual minority men experience negatively impacts their memory performance when compared to their non-sexual minority counterparts. Hence, the role of social participation and engagement would be critical for healthy aging.

Studies from the United States have reported disparities between sexual minority and non-sexual minority aging adults while Canadian studies have reported better cognitive performance levels by the sexual minority population.^{7,18,41} Such conflicting results suggest that further exploration of cognitive well-being in minority groups in the aging population is warranted and more jurisdictions need to be examined with respect to cognitive outcomes.

Funding source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethics approval statement

The study was approved by the University of Toronto's research ethics board (Protocol#: [37419]).

Consent statement

Informed consent was facilitated by the Canadian Longitudinal Study on Aging (CLSA) as the current study is a secondary data analysis.

Disclaimer

The opinions expressed in this manuscript are the author's own and do not reflect the views of the Canadian Longitudinal Study on Aging.

Data availability

Data are available from the Canadian Longitudinal Study on Aging (www.clsa-elcv.ca) for researchers who meet the criteria for access to de-identified CLSA data.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Wook Yang: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Shelley L. Craig:** Supervision, Conceptualization. **Charles Muntaner:** Supervision.

Acknowledgments

This research was made possible using the data collected by the Canadian Longitudinal Study on Aging (CLSA). Funding for the Canadian Longitudinal Study on Aging (CLSA) is provided by the Government of Canada through the [Canadian Institutes of Health Research \(CIHR\)](#) under grant reference: [LSA 94473](#) and the [Canada Foundation for Innovation](#), as well as the following provinces, Newfoundland, Nova Scotia, Quebec, Ontario, Manitoba, Alberta, and British Columbia. This research has been conducted using the CLSA Baseline Tracking Dataset version 3.7 under Application ID # 190244. The CLSA is led by Drs. Parminder Raina, Christina Wolfson and Susan Kirkland.

References

- Brooks VR. *Minority Stress and Lesbian Women*. Lexington, MA: Lexington Books; 1981.
- Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. *Psychol Bull.* 2003;129(5):674–697.
- Baams L, Grossman AH, Russell ST. Minority stress and mechanisms of risk for depression and suicidal ideation among lesbian, gay, and bisexual youth. *Dev Psychol.* 2015;51(5):688–696.
- Hottes TS, Bogaert L, Rhodes AE, Brennan DJ, Gesink D. Lifetime prevalence of suicide attempts among sexual minority adults by study sampling strategies: A systematic review and meta-analysis. *Am J Public Health.* 2016;106(5):1–12.
- Fredriksen-Goldsen KI, Kim H-J, Barkan SE, Muraco A, Hoy-Ellis CP. Health disparities among lesbian, gay, and bisexual older adults: Results from a population-based study. *Am J Public Health.* 2013;103(10):1802–1809.
- Stinchcombe A, Wilson K, Kortess-Miller K, Chambers L, Weaver B. Physical and mental health inequalities among aging lesbian, gay, and bisexual Canadians: Cross-sectional results from the Canadian Longitudinal Study on Aging (CLSA). *Can J Public Health.* 2018;109(5-6):833–844.
- Yang W, Craig SL, Anderson JAE, Ross LE, Muntaner C. Sexual orientation and cognition in aging populations: Results from the Canadian Longitudinal Study on Aging. *Acta Psychol.* 2024;242:104117. <https://doi.org/10.1016/j.actpsy.2023.104117>.
- Correro A, Nielson KA. A review of minority stress as a risk factor for cognitive decline in lesbian, gay, bisexual, and transgender (LGBT) elders. *J Gay Lesbian Ment Health.* 2020;24(1):2–19.
- Rich AJ, Salway T, Scheim A, Poteat T. Sexual minority stress theory: Remembering and honoring the work of Virginia Brooks. *LGBT Health.* 2020;7(3):124–127. <https://doi.org/10.1089/lgbt.2019.0223>.
- Stinchcombe A, Hammond NG, Wilson K. Differential effects of social support by sexual orientation: A study of depression symptoms among older Canadians in the CLSA. *Res Aging.* 2020;42(9–10):251–261.
- Ceatha N, Mayock P, Campbell J, Noone C, Browne K. The power of recognition: a qualitative study of social connectedness and wellbeing through LGBT sporting, creative, and social groups in Ireland. *Int J Environ Res Public Health.* 2019;16(19):3636. <https://doi.org/10.3390/ijerph16193636>.
- Ecker J, Rae J, Bassi A. Showing your pride: A national survey of queer student centres in Canadian colleges and universities. *High Educ.* 2015;70(5):881–898.
- Flentje Heck NC, Brennan JM, Meyer IH. The relationship between minority stress and biological outcomes: a systematic review. *J Behav Med.* 2019;43(5):673–694. <https://doi.org/10.1007/s10865-019-00120-6>.
- la Roi C, Meyer IH, Frost DM. Differences in sexual identity dimensions between bisexual and other sexual minority individuals: implications for minority stress and mental health. *Am J Orthopsychiatry.* 2019;89(1):40–51. <https://doi.org/10.1037/ort0000369>.
- Nicholson Siegel M, Wolf J, Narikuzhy S, et al. A systematic review of the neural correlates of sexual minority stress: towards an intersectional minority mosaic framework with implications for a future research agenda. *Eur J Psychotraumatol.* 2022;13(1):2002572.
- Brown MJ, Patterson R. Subjective cognitive decline among sexual and gender minorities: results from a U.S. population-based sample. *J Alzheimers Dis.* 2020;73(2):477–487.
- Stinchcombe A, Hammond N. Correlates of memory and executive function in mid-aged and older adults in the CLSA: a minority stress approach. *J Gerontol B Psychol Sci Soc Sci.* 2021. <https://doi.org/10.1093/geronb/gbab084>.
- Hsieh N, Liu H, Lai W-H. Elevated risk of cognitive impairment among older sexual minorities: do health conditions, health behaviors, and social connections matter? *Gerontologist.* 2021;61(3):352–362. <https://doi.org/10.1093/geront/gnaa136>.

19. Loeb Wardell D, Johnson CM. Coping and healthcare utilization in LGBTQ older adults: a systematic review. *Geriatr Nurs*. 2021;42(4):833–842. <https://doi.org/10.1016/j.gerinurse.2021.04.016>.
20. de Lira N, de Morais NA. Resilience in lesbian, gay, and bisexual (LGB) populations: an integrative literature review. *Sex Res Soc Policy*. 2017;15(3):272–282. <https://doi.org/10.1007/s13178-017-0285-x>.
21. Raina P, Wolfson C, Kirkland SA, et al. The Canadian Longitudinal Study on Aging (CLSA). *Can J Aging*. 2009;28(3):221–229. <https://doi.org/10.1017/S0714980809990055>.
22. Craik FIM. Memory, aging and the brain: old findings and current issues. *Neurobiology of Aging Science*. 2023;4. <https://doi.org/10.1016/j.nbas.2023.100096>.
23. Murman DL. The impact of age on cognition. *Semin Hear*. 2015;36(3):111–121.
24. Soh Y, Whitmer RA, Mayeda ER, et al. Timing and level of educational attainment and late-life cognition in the KHANDLE study. *Alzheimer Dement*. 2023;20(1):593–600. <https://doi.org/10.1002/alz.13475>.
25. Zhao X, Zheng Q, Maes JHR. Educational mobility and older adults' working memory updating ability: association and role of resilience. *Aging Ment Health*. 2023;27(8):1518–1525. <https://doi.org/10.1080/13607863.2022.2141194>.
26. Harasemiw O, Newall NE, Shooshtari S, Mackenzie C, Menec V. From social integration to social isolation: the relationship between social network types and perceived availability of social support in a national sample of older Canadians. *Res Aging*. 2018;40(8):715–739.
27. Jones CA, Jhangri GS, Yamamoto SS, et al. Social participation of older people in urban and rural areas: Canadian Longitudinal Study on Aging. *BMC Geriatr*. 2023;23(1):439. <https://doi.org/10.1186/s12877-023-04127-2>.
28. Rey A. *L'examen clinique en psychologie*. Paris: Presses Universitaire de France; 1964.
29. Magalhaes S, Malloy-Diniz LF, Hamdan AC. Validity convergent and reliability test-retest of the Rey Auditory Verbal Learning Test. *Clin Neuropsychiatry*. 2012;9(3):129.
30. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York, NY: The Guilford Press; 2013.
31. Deng N, Allison JJ, Fang HJ, Ash AS, Jr Ware JE. Using the bootstrap to establish statistical significance for relative validity comparisons among patient-reported outcome measures. *Health Qual Life Outcomes*. 2013;11:89.
32. Montoya AK, Hayes AF. Two-condition within-participant statistical mediation analysis: a path-analytic framework. *Psychol Method*. 2017;22(1):6–27. <https://doi.org/10.1037/met0000086>.
33. Yang W, Craig SL, Ross LE, Anderson JAE, Muntaner C. Impact of neighborhood deprivation on aging sexual minority people's depression: Results from the CANUE and CLSA data. *Arch Gerontol Geriatr*. 2023;112:105013. <https://doi.org/10.1016/j.archger.2023.105013>.
34. Feinstein BA, Dyar C. Bisexuality, minority stress, and health. *Curr Sex Health Rep*. 2017;9(1):42–49. <https://doi.org/10.1007/s11930-017-0096-3>.
35. Ehlke SB, Braitman AL, Dawson CA, Heron KE, Lewis RJ. Sexual minority stress and social support explain the association between sexual identity with physical and mental health problems among young lesbian and bisexual women. *Sex Role*. 2020;83(5–6):370–381. <https://doi.org/10.1007/s11199-019-01117-w>.
36. Perales-Puchalt J, Gauthreaux K, Flatt J, et al. Risk of dementia and mild cognitive impairment among older adults in same-sex relationships. *Int J Geriatr Psychiatry*. 2019;34(6):828–835.
37. World Health Organization. Ageing and health. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>. Published 2021.
38. Wang J, Liu J, Wang X, et al. Association between change in social participation and improved cognitive function among older adults in China: A national prospective cohort study. *Health Soc Care Commun*. 2022;30(6):e4199–e4210. <https://doi.org/10.1111/hsc.13814>.
39. Yuchi L, Javed A, Shirahada K. Influence of social activities on delayed memory in older adults: a cross-cultural study. *Arch Gerontol Geriatr*. 2025;129. <https://doi.org/10.1016/j.archger.2024.105664>.
40. Paolini D, Giacomantonio M, Beest I, Baiocco R, Salvati M. Social exclusion lowers working memory capacity in gay-men but not in heterosexual-men. *Appl Cognit Psychol*. 2020;34(3):761–767. <https://doi.org/10.1002/acp.3661>.
41. Seelman KL. Differences in mental, cognitive, and functional health by sexual orientation among older women: analysis of the 2015 Behavioral Risk Factor Surveillance System. *Gerontologist*. 2019;59(4):749–759. <https://doi.org/10.1093/geront/gnx215>.