

**BRIEF REPORT**

# The Association Between Social Isolation and Memory Loss Among Older Adults

David M. Mosen, PhD, MPH, Matthew P. Banegas, PhD, MPH, MS,  
Erin M. Keast, MPH, and Briar L. Ertz-Berger, MD, MPH

**Introduction:** Social isolation among older individuals is associated with poor health outcomes. However, less is known about the association between social isolation and memory loss, specifically among Medicare enrollees in large, integrated health care systems.

**Methods:** We conducted a cross-sectional, observational study. From a cohort of 46,240 Medicare members aged 65 years and older at Kaiser Permanente Northwest (KPNW) who completed a health questionnaire, we compared self-reported memory loss of those who reported feeling lonely or socially isolated and those who did not, adjusting for demographic factors, health conditions, and use of health services in the 12 months before the survey.

**Results:** Patients who reported sometimes experiencing social isolation were more likely than those who rarely or never experienced social isolation to report memory loss in both unadjusted (odds ratio [OR<sub>sometimes</sub>]: 2.56, 95% CI = 2.42-2.70, *P* = 0.0076) and adjusted (OR<sub>sometimes</sub>: 2.45, 95% CI = 2.32-2.60, *P* = .0298) logistic regression models. Similarly, those who reported social isolation often or always were more likely to report memory loss than those who reported rarely or never experiencing isolation in both unadjusted (OR<sub>often/always</sub>: 5.50, 95% CI = 5.06-5.99, *P* < .0001) and adjusted logistic regression models (OR<sub>often/always</sub>: 5.20, 95% CI = 4.75-5.68, *P* < .0001).

**Conclusions:** The strong association between social isolation and memory loss suggest the need to develop interventions to reduce isolation and to evaluate their effects on potential future memory loss. (J Am Board Fam Med 2022;00:000–000.)

**Keywords:** Integrated Health Care Systems, Logistic Models, Medicare, Memory Disorders, Outcome Assessment, Risk Assessment, Self-Report, Social Determinants of Health, Social Isolation

## Introduction

Social isolation is a very important social risk factor for older adults.<sup>1–3</sup> Previous research has found that social isolation is consistently associated with poor health outcomes<sup>4–8</sup> and increased

morbidity and mortality.<sup>9–13</sup> Social isolation is particularly common in those aged 65 and older, affecting approximately 25% of this population.<sup>14,15</sup>

A report from the National Academies of Sciences (2020) showed that older adults who were socially isolated were at increased risk of developing long-term memory loss and Alzheimer disease and related dementias (ADRD).<sup>3</sup> Another study found an association between social isolation and increased memory loss for both older men and women.<sup>16</sup> However, prior studies were limited because they have not been conducted within integrated health care delivery systems and did not include older patients with Medicare insurance coverage seeking routine medical care. Such research is needed from a policy perspective to inform the development of Medicare interventions to address social isolation within the clinical

This article was externally peer reviewed.

Submitted 11 December 2021; revised 20 December 2021; 28 June 2022; accepted 30 June 2022; *Ahead of Print Publication* 15 September 2022; *Final Publication* XX XXXX 2022.

From Kaiser Permanente Center for Health Research, Portland (DMM, MPB, EMK); Northwest Permanente, Continuum of Care Department, Portland, OR (BLE-B)

**Funding:** Funding for this project was provided by the following: NCI Grant #R01CA237322 (Henrikson; Banegas, MPI) and 2) NIDCR Grant # R21DE029026 (Mosen; Banegas, MPI).

**Conflict of interest:** None.

**Corresponding author:** David M. Mosen, PhD, MPH, 3800 N. Interstate Ave., Portland, OR 97227 (E-mail: david.m.mosen@kpchr.org).

setting. The objective of this analysis was to examine the association of social isolation with memory loss among an Medicare beneficiaries within a large, integrated health system.

## Methods

### *Analytic Cohort*

We examined survey and health information from 46,240 Medicare members (aged 65 years and older) of Kaiser Permanente Northwest (KPNW). Patients were included if they completed a health questionnaire, the Medicare Total Health Assessment (MTHA) between 3/1/2013 and 2/28/2021 and had continuous KPNW Medicare insurance coverage in the 12 months prior to survey completion. The MTHA is administered to Medicare members before annual wellness visits to assess issues critical to management of ongoing geriatric care, including living situation, falls, incontinence, cognition, basic and instrumental activities of daily living, tobacco and alcohol use, physical activity, nutrition, and home safety. The validity of the MTHA has been described previously,<sup>17</sup> specifically with respect to social isolation.<sup>18</sup> Since 2013, patients completed the survey by 1 of 3 methods (patient e-mail, by telephone with interactive voice recognition, in person). The study protocol and information were approved by the KPNW Institutional Review Board.

### *Outcome Measure*

The outcome measure of interest was memory loss, defined by responses of “yes” or “no” to the following survey question: “In the last year, have any of your friends and family felt concerned about changes in your memory, attention, language, skills, or thinking?” This question was adapted from the PROMIS Applied Cognition-Abilities 4-item scale, a measure with high validity and reliability<sup>19</sup> by the KP Medicare Total Health Assessment Expert Clinical Panel.<sup>20</sup>

### *Independent Variable*

The primary independent variable was social isolation based on responses to the MTHA question: “How often do you feel lonely or isolated from those around you?” The question was adapted from the Patient-Reported Outcome Measurement Information System (PROMIS) version 1.0, has good psychometric properties,<sup>21,22</sup> and has been

used in other research studies.<sup>18</sup> A 5-point Likert scale measured responses with the following options: always, often, sometimes, rarely, and never. To obtain sufficient sample size and to analyze social isolation from most isolated to least isolated, we consolidated results as follows: “always/often,” “sometimes,” and “rarely/never.”

### *Covariate Measures*

Covariate measures were extracted from KPNW’s electronic health record at the time of the index MTHA. Demographic variables were age, sex, race/ethnicity (White, Black/African-American, Hispanic/Latinx, Asian-American, Native American/Alaskan Native, Hawaiian/Pacific Islander, more than 1 race, unknown/other), and Area Deprivation Index (ADI).<sup>23</sup> The Charlson comorbidity index (CCI) was calculated for all patients,<sup>24,25</sup> categorizing them as having 0, 1, or 2 or more comorbidities in the 12 months before the index MTHA. Prior health care utilization was assessed by determining whether individuals had any hospital admissions, emergency department (ED) visits, or primary care visits in the 12 months before the index survey. All utilization variables were categorized as none vs 1 or more. We also measured whether surveys were conducted before the COVID-19 pandemic (3/1/2013–2/28/2020) or during the pandemic (3/1/2020–2/28/2021).

### *Statistical Analyses*

Multivariable logistic regression models were used to assess the association between social isolation and memory loss. We present these results, both unadjusted and adjusted for all covariate measures. Odds ratios (OR) and 95% confidence intervals (CIs) for regression estimates were reported. Statistical significance was defined as  $\alpha$  less than 0.05.

## Results

### *Population Characteristics*

The average age of patients was 73.2 years, and nearly 60% were female (Table 1). The study population had ADI values across the spectrum (range 1 to 10), whereas 49.3% had a CCI of 1 or more. About 90% of the sample was White, with African Americans, Hispanic/Latinx patients, and Asian Americans making up 1.4%, 2.4%, and 2.2% of the

**Table 1. Population Characteristics of Study Population<sup>1</sup>**

	Social Isolation			
	Never/Rarely n = 36048 (78.0%) mean ± SD, N (%)	Sometimes n = 7791 (16.8%) Mean ± SD, N (%)	Often/Always n = 2401 (5.2%) Mean ± SD, N (%)	All n = 46240 (100.0%) Mean ± SD, N (%)
Age (mean, standard deviation)	73.1 ± 7.8	73.6 ± 9.1	73.0 ± 10.6	73.2 ± 8.2
Female	19474 (54.0)	4918 (63.1)	1587 (66.1)	25979 (56.2)
Race/Ethnicity				
White	32709 (90.7)	6945 (89.1)	2136 (89.0)	41790 (90.4)
Black/African-American	478 (1.3)	132 (1.7)	38 (1.6)	648 (1.4)
Hispanic/Latinx	786 (2.2)	223 (2.9)	83 (3.5)	1092 (2.4)
Asian-American	820 (2.3)	165 (2.1)	36 (1.5)	1021 (2.2)
Native American/Alaska Native	47 (0.1)	10 (0.1)	7 (0.3)	64 (0.1)
Hawaiian / Pacific Islander	37 (0.1)	11 (0.1)	3 (0.1)	51 (0.1)
More than one race	991 (2.8)	254 (3.3)	81 (3.4)	1326 (2.9)
Unknown/other	180 (0.5)	51 (0.7)	17 (0.7)	248 (0.5)
Area Deprivation Index (ADI)				
1 to 3 (least disadvantaged)	13683 (38.0)	2613 (33.5)	725 (30.2)	17021 (36.8)
4 to 6	12190 (33.8)	2618 (33.6)	799 (33.3)	15607 (33.8)
7 to 10 (most disadvantaged)	9591 (26.6)	2442 (31.3)	847 (35.3)	12880 (27.9)
Unknown	584 (1.6)	118 (1.5)	30 (1.3)	732 (1.6)
Charlson Comorbidity Index (CCI)				
0	19066 (52.9)	3504 (45.0)	858 (35.7)	23428 (50.7)
1	5510 (15.3)	1241 (15.9)	412 (17.2)	7163 (15.5)
2+	11472 (31.8)	3046 (39.1)	1131 (47.1)	15649 (33.8)
1+ hospital admissions	3717 (10.3)	1141 (14.6)	500 (20.8)	5358 (11.6)
1+ ED visits	6921 (19.2)	2144 (27.5)	945 (39.4)	10010 (21.6)
1+ primary care visits	28342 (78.6)	6438 (82.6)	2070 (86.2)	36850 (79.7)
COVID-19 Era				
2/28/13- 2/28/20: Before Pandemic Era	34102 (94.6)	7196 (92.4)	2173 (90.5)	43471 (94.0)
3/1/2020 – 2/28/21: During Pandemic Era	1946 (5.4)	595 (7.6)	228 (9.5)	2769 (6.0)

Abbreviations: ED, Emergency department; SD, Standard deviation.

<sup>1</sup>Results based on 46,240 Medicare members (aged 65 years or older) of Kaiser Permanente Northwest (KPNW) who completed an index Medicare Total Health Assessment (MTHA) survey between March 1, 2013, and February 28, 2021, (8 years) and had KPNW insurance in the 12 months before survey completion.

sample, respectively. We had complete data for most study variables, with the exception of race/ethnicity and ADI, for which we had very small levels of missing data: 0.5% (unknown or other) and 1.6% (values), respectively. Among the full study population, 11.6% had 1 or more hospital admissions in the year before index survey, and 21.6% had 1 or more ED visits. Less than 10% of respondents (5.2% [n = 2401]) reported that they always or often felt socially isolated, 16.8% (n = 7791) reported feeling socially isolated sometimes, and nearly 80% (78.0% [n = 36,048]) reported rarely or never feeling socially isolated.

#### **Relationship between Social Isolation and Memory Loss**

In both unadjusted and adjusted logistic regression models (Table 2), patients who reported sometimes feeling socially isolated had significantly greater odds of memory loss compared with those who reported social isolation rarely or never (unadjusted:  $OR_{\text{sometimes}} = 2.56$ , 95% CI = 2.42-2.70,  $P = 0.0076$ ; adjusted:  $OR_{\text{sometimes}} = 2.45$ , 95% CI = 2.32-2.60,  $P = 0.0298$ ). Moreover, those who reported always or often feeling socially isolated also had greater odds of memory loss in both unadjusted ( $OR_{\text{always/often}} = 5.50$ , 95% CI = 5.06-5.99,  $P < 0.0001$ ) and adjusted ( $OR_{\text{always/often}} = 5.20$ , 95%

**Table 2. Logistic Regression Results: Association of Social Isolation with Memory Loss. Unadjusted and Adjusted for Covariates**

Total Population (Unadjusted for Study Covariates) <sup>1,2</sup>	Memory Loss (vs. no Memory Loss)			
	OR (Unadjusted)	95% CI		p-value
Social Isolation				
Never/Rarely	Reference			
Sometimes	<b>2.56</b>	<b>2.42</b>	<b>2.70</b>	<b>0.0076</b>
Often/Always	<b>5.50</b>	<b>5.06</b>	<b>5.99</b>	<b>&lt;0.0001</b>

  

Total Population (Adjusted for Study Covariates) <sup>1,3,4</sup>	Memory Loss (vs. no Memory Loss)			
	OR (Adjusted) <sup>1</sup>	95% CI		p-value
Social Isolation				
Never/Rarely	Reference			
Sometimes	<b>2.45</b>	<b>2.32</b>	<b>2.60</b>	<b>0.0298</b>
Often/Always	<b>5.20</b>	<b>4.75</b>	<b>5.68</b>	<b>&lt;0.0001</b>

Abbreviations: ED, Emergency department; SD, Standard deviation; OR, Odds ratio; CI, Confidence interval.

<sup>1</sup>Results based on 46,240 Medicare members (aged 65 years or older) of Kaiser Permanente Northwest (KPNW) who completed an index MTHA survey between March 1, 2013, and February 28, 2021, (8 years) and had KPNW insurance in the 12 months before survey completion. Significant results are displayed in bold, italicized font.

<sup>2</sup>ROC (Area Under the Curve, *unadjusted* for study covariates)=0.615.

<sup>3</sup>Model adjusted for age, sex, race/ethnicity, Area Deprivation Index (ADI), Charlson Comorbidity Index (CCI), prior hospital admissions, ED visits, primary care visits and COVID-19 Era.

<sup>4</sup>ROC (Area Under the Curve, *adjusted* for study covariates) = 0.696.

CI=4.75-5.68,  $P < 0.0001$ ) models than those who reported rarely or never feeling isolated.

## Discussion

Our study found that self-reported social isolation was associated with increased self-reported memory loss among a cohort of Medicare members. These findings support previous study findings that social isolation is associated with poor outcomes<sup>3,6,8,16</sup> and mortality among older adults.<sup>9</sup> Our findings are unique and advance knowledge on social isolation and memory loss, primarily because of the “real-world” health care delivery setting in which the study was conducted. Although other studies have found an association between social isolation and cognitive impairment,<sup>16,26</sup> this is the first study to examine this association among Medicare patients receiving wellness visits over an 8-year period. These results have policy significance because they demonstrate a strong association between social isolation and memory loss in a Medicare population, providing an evidence base and underscoring the importance of developing future interventions to reduce social isolation for the Medicare population.

Previous research findings identify possible reasons for an association between social isolation and memory loss among older adults. Among them are that social support may act as a buffer to stress<sup>27</sup> and can help patients identify the need for medical intervention and seek care.<sup>27,28</sup> In the absence of this social support, increased stress<sup>29,30</sup> can hasten the onset of memory loss. Further, due to increased isolation, older adults may delay care, possibly leading to delayed diagnosis and treatment for memory loss.

Our key findings are consistent with the 2020 National Academy of Sciences report that found social isolation was associated with a 50% increase in ADRD.<sup>3</sup> They are also similar to studies that found less frequent social contact and lower levels of community involvement were associated with lower global cognition, executive function, visuospatial abilities, and processing speed.<sup>26</sup> Future research should identify interventions to reduce social isolation among older individuals – and evaluate whether such interventions slow the onset of memory loss.

## Limitations

Our study findings had several limitations. First, because this is a cross-sectional study design, we

cannot infer the temporal order of the relationship between social isolation and memory loss, either 1 could have occurred before the other, or the 2 variables could interact. Second, the study population may not be generalizable to that in fee-for-service settings. Third, we did not have information regarding the survey response rate or survey non-respondents, raising the possibility that nonresponse bias could have impacted results. However, by grouping multiple years of MTHA data across years, we constructed a sample of Medicare beneficiaries that generally reflected KPNW membership. Third, data on social isolation were collected via self-report and might be subject to recall and social desirability biases. Fourth, the population studied was approximately 90% white. Although this population is generally representative of the Kaiser Permanente Northwest Medicare population overall, a limitation of the study is that it was not conducted in a more racially diverse population. Finally, we measured memory loss at only 1 point in time rather than longitudinally.

## Conclusion and Learnings for Clinical Practice

Our study found that social isolation was associated with memory loss among a population of Medicare members aged 65 years and older. Results have clear implications for clinical practice. Specifically, these results demonstrate the importance of screening for and identifying social isolation and loneliness in the clinical setting, as well as the need for interventions and strategies that link patients with services to address social isolation. Such programs have the potential to slow the onset of memory loss among older adults. Future research should identify: 1) critical components of successful interventions to reduce social isolation and 2) whether reducing social isolation over time slows memory loss.

---

Authors would like to acknowledge Katie Essick and Neon Brooks for providing editing services to the project and Summer Rivera for providing administrative support for the submission of this manuscript.

To see this article online, please go to: <http://jabfm.org/content/35/0/000.full>.

## References

1. Merchant RA, Liu SG, Lim JY, Fu X, Chan YH. Factors associated with social isolation in community-

- dwelling older adults: A cross-sectional study. *Qual Life Res* 2020;29:2375–81.
2. Arons A, DeSilvey S, Fichtenberg C, Gottlieb L. Documenting social determinants of health-related clinical activities using standardized medical vocabularies. *JAMIA Open* 2019;2:81–8.
3. National Academies of Sciences, Engineering, Medicine. *Social isolation and loneliness in older adults: Opportunities for the health care system*. National Academies Press; 2020.
4. Cacioppo JT, Hawkley LC. Social isolation and health, with an emphasis on underlying mechanisms. *Perspect Biol Med* 2003;46:S39–52.
5. Cornwell EY, Waite LJ. Social disconnectedness, perceived isolation, and health among older adults. *J Health Soc Behav* 2009;50:31–48.
6. Coyle CE, Dugan E. Social isolation, loneliness and health among older adults. *J Aging Health* 2012;24:1346–63.
7. *Social determinants of health: The solid facts*. World Health Organization. Regional Office for Europe; 2003.
8. Hämmig O. Health risks associated with social isolation in general and in young, middle and old age. *PLoS One* 2019;14:e0219663.
9. Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspect Psychol Sci* 2015;10:227–37.
10. Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: A meta-analytic review. *PLoS Med* 2010;7:e1000316.
11. Tanskanen J, Anttila T. A prospective study of social isolation, loneliness, and mortality in Finland. *Am J Public Health* 2016;106:2042–8.
12. Laugesen K, Baggesen LM, Schmidt SAJ, et al. Social isolation and all-cause mortality: A population-based cohort study in Denmark. *Sci Rep* 2018;8:4731.
13. Alcaraz KI, Eddens KS, Blase JL, et al. Social isolation and mortality in US black and white men and women. *Am J Epidemiol* 2019;188:102–9.
14. Cudjoe TKM, Roth DL, Szanton SL, Wolff JL, Boyd CM, Thorpe RJ. The epidemiology of social isolation: National health and aging trends study. *J Gerontol B Psychol Sci Soc Sci* 2020;75:107–13.
15. Ortiz H. Crossing New Frontiers: Benefits Access Among Isolated Seniors. *National Center for Benefits Outreach and Enrollment (NCBOE). National Council on Aging*. 2011. Available from: [www.CenterforBenefits.org](http://www.CenterforBenefits.org).
16. Read S, Comas-Herrera A, Grundy E. Social isolation and memory decline in later-life. *J Gerontol B Psychol Sci Soc Sci* 2020;75:367–76.
17. Steiner JF, Stenmark SH, Sterrett AT, et al. Food insecurity in older adults in an Integrated Health Care System. *J Am Geriatr Soc* 2018;66:1017–24.

18. Mosen DM, Banegas MP, Tucker-Seeley RD, et al. Social isolation associated with future health care utilization. *Popul Health Manag* 2021;24:333–7.
19. Saffer BY, Lanting SC, Koehle MS, Klonsky ED, Iverson GL. Assessing cognitive impairment using PROMIS<sup>®</sup> applied cognition-abilities scales in a medical outpatient sample. *Psychiatry Res* 2015;226:169–72.
20. KP Medicare Total Health Assessment Expert Clinical Panel. 2012; Link to MTHA Survey included here: [https://mydoctor.kaiserpermanente.org/ncal/Images/Medicare%20Total%20Health%20Assessment%20Questionnaire\\_tcm75-487922.pdf](https://mydoctor.kaiserpermanente.org/ncal/Images/Medicare%20Total%20Health%20Assessment%20Questionnaire_tcm75-487922.pdf).
21. Hahn EA, DeWalt DA, Bode RK, PROMIS Cooperative Group, et al. New English and Spanish social health measures will facilitate evaluating health determinants. *Health Psychol* 2014;33:490–9.
22. Cella D, Riley W, Stone A, PROMIS Cooperative Group, et al. The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005–2008. *J Clin Epidemiol* 2010;63:1179–94.
23. Tuliani TA, Shenoy M, Parikh M, Jutzy K, Hilliard A. Impact of Area Deprivation Index on coronary stent utilization in a Medicare nationwide cohort. *Popul Health Manag* 2017;20:329–34.
24. Kieszak SM, Flanders WD, Kosinski AS, Shipp CC, Karp H. A comparison of the Charlson comorbidity index derived from medical record data and administrative billing data. *J Clin Epidemiol* 1999;52:137–42.
25. Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *J Clin Epidemiol* 1992;45:613–9.
26. Kelly ME, Duff H, Kelly S, et al. The impact of social activities, social networks, social support and social relationships on the cognitive functioning of healthy older adults: A systematic review. *Syst Rev* 2017;6:259.
27. Gourash N. Help-seeking: a review of the literature. *Am J Community Psychol* 1978;6:413–23.
28. Bass DM, Noelker LS. The influence of family caregivers on elder's use of in-home services: an expanded conceptual framework. *J Health Soc Behav* 1987;28:184–96.
29. McEwen BS. Stress and hippocampal plasticity. *Annu Rev Neurosci* 1999;22:105–22.
30. Kim JJ, Diamond DM. The stressed hippocampus, synaptic plasticity and lost memories. *Nat Rev Neurosci* 2002;3:453–62.