

## Brief Report

# The Epidemiology of Social Isolation: National Health and Aging Trends Study

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## Abstract

**Objectives:** Social isolation among older adults is an important but under-recognized risk for poor health outcomes. Methods are needed to identify subgroups of older adults at risk for social isolation.

**Methods:** We constructed a typology of social isolation using data from the National Health and Aging Trends Study (NHATS) and estimated the prevalence and correlates of social isolation among community-dwelling older adults. The typology was formed from four domains: living arrangement, core discussion network size, religious attendance, and social participation.

**Results:** In 2011, 24% of self-responding, community-dwelling older adults (65+ years), approximately 7.7 million people, were characterized as socially isolated, including 1.3 million (4%) who were characterized as severely socially isolated. Multinomial multivariable logistic regression indicated that being unmarried, male, having low education, and low income were all independently associated with social isolation. Black and Hispanic older adults had lower odds of social isolation compared with white older adults, after adjusting for covariates.

**Discussion:** Social isolation is an important and potentially modifiable risk that affects a significant proportion of the older adult population.

**Keywords:** Living arrangement, Participation, Social isolation, Social networks, Social relationships

Social isolation is a global problem that influences the health of individuals across the life-course. Social isolation is the objective physical separation from others (National Academy of Sciences & National Institute on Aging, 2015) and exists in the “absence of social relationships” (Umberson & Karas Montez, 2010). As individuals age, social relationships may change for a variety of reasons including geographic migration of children, relatives, or friends; death or disability among social network members; as well as personal factors including decline in physical or cognitive abilities. Social relationships are influenced by social resources that include living arrangements, social

contacts, and participation in social and religious activities (Barnes, Mendes de Leon, Carlos F, Bienias, & Evans, 2004; Berkman & Syme, 1979; Seeman, 2000). Social resources are essential for preventing social isolation and mitigating health risks including poor quality of life, physical disability, and cognitive impairments (National Research Council & Committee on Population, 2004). Many have studied social isolation as a risk factor; however, few have explored the sociodemographic factors that may predispose older adults to this problem. Understanding the factors that may alter an older adult’s risk for social isolation may aid in the development of policies or interventions

that prevent or address this important problem. Here we aimed to describe a typology of social isolation, present its national prevalence among older adults, and examine the sociodemographic correlates of social isolation.

Studies have demonstrated that the presence of social connections is associated with important positive health effects including decreased mortality, better immune function, and lower levels of cardiovascular disease progression (Berkman, Glass, Brissette, & Seeman, 2000; Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997; Steptoe, Shankar, Demakakos, & Wardle, 2013). Social isolation exists in varying states of severity; studies have evaluated threshold effects that account for variance in vulnerability and outcomes (Hawton et al., 2011; LaVeist, Sellers, Brown, & Nickerson, 1997). These differing levels of social integration have had mixed results with some studies finding differential effects of the degree of social isolation on mortality (Heffner, Waring, Roberts, Eaton, & Gramling, 2011) and others not supporting this idea (Pantell et al., 2013). In light of previous indication that social isolation is not a binary risk factor, identifying different groups based on severity and determining whether sociodemographic correlates differ between these groups should be informative. Understanding the presence or absence of associated sociodemographic correlates of specific levels of social isolation may assist in further targeting interventions at specific at-risk populations.

In our analysis, we sought to understand objective social isolation, whereas others have characterized measures for perceived social isolation (Cornwell & Waite, 2009). The Berkman-Syme Social Network Index (BSNI) employs measures of marital status, close ties, church attendance, and social participation to characterize social isolation (Berkman & Syme, 1979). We adapted the BSNI utilizing measures in NHATS (more information at <https://www.nhats.org/scripts/dataCollUserGuide.htm>). We included living arrangement as an alternative indicator to marital status. Living alone is an at-risk state for older adults (Victor, Scambler, Bond, & Bowling, 2000), and is sometimes considered a proxy measure of social isolation (Schmaltz et al., 2007). We also included a social network question that examines the participant's core discussion network size. This NHATS question is adapted from decades of work indicating the importance of the number of people a participant talks to about important matters (Burt, 1984; Cornwell, Schumm, Laumann, & Gruber, 2009; Marsden, 1987). Advancing this social isolation typology will inform future analyses, which will examine how this risk influences disability and function, which are strengths of NHATS.

## Methods

### Data

Data come from NHATS, an annual nationally representative longitudinal study of Medicare beneficiaries that

examines disability trends and trajectories of individuals aged 65 and older living in the contiguous United States. Older persons (85+) and blacks were oversampled by design. Participant interviews collected information on function, economic and health status, and well-being (Montaquila, Freedman, Edwards, & Kasper, 2012). Medicare is insurance coverage for more than 98% of the U.S. population that are 65 and older (Mold, Fryer, & Thomas, 2004).

### Social Isolation Typology

We developed a multidomain typology consistent with prior recommendations to assess social isolation by combining multiple measures (Cornwell & Waite, 2009). Participants received 1 point for each of the following: living with at least one other person, talking to two or more people about "important matters" in the past year, attending religious services in the past month, and participating in other activities (clubs, meetings, or group activities, or doing volunteer work) in the past month. We grouped the responses to the "important matters" question into 0 and 1 versus 2 or more based on previous classification of core discussion network responses of 0 or 1 as "inadequate" or "marginal", respectively (Fischer, 1982). Participants with a sum score of zero were classified as severely socially isolated, those with a sum score of 1 were classified as socially isolated, and those with sum scores of 2 or more as socially integrated.

### Correlates of Social Isolation

We examined sociodemographic factors: age (intervals of 5 years), gender (male/female) and race (white, black, Other, Hispanic), marital status (married or living with a partner/divorced, separated, widowed or never married), education (none or less than high school [H.S.] completed, H.S. graduate/equivalent or vocational/trade diploma and some college and beyond), and total household income where available. Missing values were replaced with imputed values provided in the NHATS dataset, which were generated using a hot deck procedure (Montaquila, Freedman, & Kasper, 2012). Geographic residence was assessed as metropolitan or non-metropolitan county derived from Rural-Urban Continuum Codes (more information at <https://www.nhats.org/scripts/MetroNonmetroResIndicator.htm>).

### Statistical Analysis

Our analysis focused on community-dwelling older adults ( $n = 7,197$ ) in Round 1 (2011) to examine the national prevalence of social isolation. National estimates of social isolation were obtained using analytic survey weights to account for differential selection probabilities and to adjust for potential nonresponse bias (Montaquila, Freedman, Spillman, & Kasper, 2012). Our analysis was

restricted to participants that responded to each component of the social isolation typology; thus, 548 participants were excluded due to missing information across typology domains, leaving 6,649 (92% of community-dwelling participants) for the analytic sample. For both levels of social isolation, we compared differences on sociodemographic factors (age, marital status, gender, race, geographic residence, income, and education) using weighted bivariate analysis. We also performed unadjusted multinomial logistic regression to test the significance of differences based on sociodemographic factors between severe social isolation and social isolation to social integration. Lastly, after adjusting for sociodemographic factors, we performed a multinomial multivariable logistic regression for severe social isolation and social isolation compared with social integration.

## Results

### Prevalence

As summarized in Table 1, an estimated 7.7 million (24%) of community-dwelling older adults were socially isolated. The most severely socially isolated comprise 4% of the total population of older adults, an estimated 1.3 million people.

### Unadjusted Descriptive Effects

Table 2 includes sociodemographic characteristics of the NHATS community-dwelling analytic sample of older adults. Severe social isolation and social isolation was more likely among participants that were older (age intervals: 80–84, 85–90, and 90+), unmarried, had lower education and lower income, compared with the socially integrated. For example, participants who were 90+ years old had almost three times the rate of experiencing severe social isolation compared with social integration. The socially isolated were more likely to be male (52.5% vs. 41.9%,  $p < .0001$ ) and reside in non-metropolitan counties (21.6% vs. 17.6%,  $p = .0162$ ), whereas gender and geographic residence differences were absent in the severe social isolation group. Lastly, no statistically significant racial differences were identified in the unadjusted analysis. Findings from unadjusted multinomial logistic regression analyses are reported in Table 3.

## Adjusted Effects from Multinomial Multivariable Logistic Regression

Older adults in the severe social isolation and social isolation groups were more likely to be male (odds ratio [OR] 4.14, 95% confidence interval [CI] 3.09–5.55; and OR 2.60, 95% CI 2.20–3.06, respectively), have lower education (OR 2.18, 95% CI 1.40–3.40; and OR 2.15, 95% CI 1.71–2.70) and lower income (OR 2.10, 95% CI 1.08–4.07; and OR 1.79, 95% CI 1.39, 2.31), after adjustment (Table 3). In addition, black (OR 0.57, 95% CI 0.41–0.79; and OR 0.65, 95% CI 0.54–0.79) and Hispanic (OR 0.46, 95% CI 0.23–0.95; and OR 0.60, 95% CI 0.42–0.85) older adults were less likely than white to experience either form of social isolation. Older adults who were widowed, separated, divorced, or never married (OR 2.92, 95% CI 2.44–3.50) were more likely to experience social isolation. No significant effect differences were demonstrated between geographic residence groups.

## Discussion

This nationally representative study of older adults finds that approximately one in four community-dwelling participants were socially isolated. Our findings that among older adults, male gender, lower educational attainment, and lower income were associated with social isolation is consistent with previous research (Beach & Bamford, 2014; Evans, Wethington, Coleman, Worms, & Frongillo, 2008; Steptoe et al., 2013). Studies that have examined the role of gender on social isolation have had varied results. Shankar and associates (2011) found no gender difference, whereas others have demonstrated that male gender is associated with social isolation (Vandervoort, 2000). We believe that our findings further strengthen this conclusion regarding male gender because the effects persisted after adjustment.

We found that black and Hispanic older adults were less likely than white older adults to experience severe social isolation and social isolation, after adjusting for sociodemographic covariates. Our findings differ from a previous smaller study that found no racial difference in social integration (Troxel et al., 2010). Locher and associates examined racial and geographic residence differences among older adults in one state. Their findings concluded that blacks were more likely to be socially isolated than whites; they

**Table 1.** Prevalence and Number of Community-Dwelling Medicare Beneficiaries Age 65 by Severe Social Isolation and Social Isolation Using NHATS, United States, 2011

	Number	Unweighted % (95% CI)	Number	Weighted % (95% CI)
Severe social isolation	308	4.63 (4.13,5.14)	1,262,957	4.01 (3.56, 4.46)
Social isolation	1,401	21.07 (20.09,22.05)	6,390,979	20.30 (19.03, 21.56)
Social integration	4,940	74.30 (73.25,75.35)	23,833,728	75.69 (74.23, 77.16)
Total	6,649		31,487,664	

Note. NHATS = National Health and Aging Trends Study; CI = confidence interval. Number of observations = 7,197; missing = 548.

**Table 2.** Weighted Unadjusted Bivariate Analysis of Demographic Associations With Social Isolation Among Community-Dwelling Medicare Beneficiaries Using NHATS, United States, 2011

Characteristic	Total NHATS analytic sample (N = 6649)	Severe social isolation (n = 308)	p Value	Social isolation (n = 1401)	p Value	Social integration (n = 4940)
Age group (%)						
65–69 y (ref)	30.2	22.7	—	27.6	—	31.3
70–74 y	26.1	26.3	0.1507	25.8	0.3316	26.2
75–79 y	19.4	14.5	0.9911	18.1	0.8236	20.0
80–84 y	14.1	17.2	0.0307	15.1	0.0447	13.7
85–89 y	7.4	13.2	<.0001	9.3	0.0002	6.6
>90 y	2.7	6.0	<.0001	4.2	<.0001	2.2
Gender (%)						
Female (ref)	55.8	54.6	—	47.5	—	58.1
Male	44.2	45.4	0.3125	52.5	<.0001	41.9
Marital status (%)						
Married/ living with partner (ref)	59.9	1.0	—	44.7	—	67.1
Widowed, separated, divorced, never married	40.1	99.0	<.0001	55.3	<.0001	32.9
Living arrangement (%)						
Living with others (ref)	72.5	0	—	55.3	—	80.9
Alone	27.5	100.0	<.0001	44.7	<.0001	19.1
Race (%)						
White (ref)	82.0	81.8	—	81.8	—	82.1
Black	8.1	10.0	0.1238	8.2	0.6931	8.0
Hispanic	6.8	5.8	0.6254	6.7	0.8910	6.9
Other	3.1	2.4	0.5933	3.3	0.7647	3.1
Education (%)						
More than High School (ref)	44.5	26.3	—	33.3	—	48.4
High school/GED/Trade	35.0	42.3	<.0001	35.9	<.0001	34.3
Less than high school	20.5	31.4	<.0001	30.8	<.0001	17.2
Total joint income (%)						
≥\$60,000 (ref)	26.8	7.5	—	16.8	—	30.5
\$30,000–\$59,999	27.9	13.2	0.0963	23.6	0.0030	29.8
\$15,000–\$29,999	23.8	35.6	<.0001	29.4	<.0001	21.7
<\$15,000	21.6	43.7	<.0001	30.1	<.0001	18.1
Geographic residence (%)						
Metropolitan (ref)	81.6	82.3	—	78.4	—	82.4
Non-metropolitan	18.4	17.7	0.9841	21.6	0.0162	17.6

Note. NHATS = National Health and Aging Trends Study.

also found no difference in risk for social isolation between metropolitan or non-metropolitan geographic residence (2005). Studies have demonstrated that blacks in comparison to whites have and rely upon more kin in their support networks than friends (Ajrouch, Antonucci, & Janevic, 2001). We did not evaluate the presence of kin. A recent analysis identifies kinless older adults and suggests that they may be at risk for social isolation (Margolis & Verdery, 2017). Our finding about Hispanic race differs from previous work that assessed social isolation using living arrangement and perception of social isolation (Tomaka, Thompson, & Palacios, 2006). Our analysis provides an important contribution due to the presence of sufficient power to examine the role of race on social isolation after adjusting for other covariates due to the large sample size. Other researchers in large

population-based studies have studied social isolation and its associations with numerous health outcomes. However, to our knowledge, no prior report has studied it utilizing a multidomained characterization of social isolation focusing on the influences of sociodemographic factors in a nationally representative cohort of older adults aged 65+ inclusive of both genders and with an oversampling of blacks and individuals aged 85+.

Our study has limitations. We conducted a cross-sectional analysis aimed at identifying the national prevalence and correlates of social isolation among older adults but were not able to test causality or longitudinal changes. Due to missing data for our social isolation typology, we excluded 548 (8%) community-dwelling participants from our analytic sample. These participants with missing data differed

**Table 3.** Weighted Logistic Regression of Severe Social Isolation (*n* = 308) and Social Isolation (*n* = 1,401) NHATS, United States, 2011

	Severe social isolation		Social isolation	
	OR (95% CI)			
	Unadjusted	Adjusted	Unadjusted	Adjusted
<b>Age</b>				
65–69	1.00	1.00	1.00	1.00
70–74	1.38 (0.89,2.16)	0.95 (0.59,1.53)	1.12 (0.89,1.39)	0.92 (0.74,1.14)
75–79	1.00 (0.64,1.55)	0.66 (0.41,1.06)	1.02 (0.83,1.26)	0.79 (0.64,0.97)*
80–84	1.74 (1.06,2.86)*	0.90 (0.54,1.51)	1.25 (1.01,1.56)*	0.88 (0.71,1.10)
85–89	2.74 (1.76,4.28)***	1.00 (0.63,1.57)	1.59 (1.26,2.01)**	0.97 (0.77,1.24)
90+	3.81 (2.38,6.08)***	1.08 (0.65,1.79)	2.18 (1.65,2.89)***	1.16 (0.85,1.59)
<b>Gender</b>				
Female	1.00	1.00	1.00	1.00
Male	1.15 (0.87,1.53)	4.14 (3.09,5.55)***	1.53 (1.32,1.79)***	2.60 (2.20,3.06)***
<b>Marital status</b>				
Married/ living with partner	1.00	1.00	1.00	1.00
Widowed, separated, divorced, never married	211.86 (46.25,970.45)***	259.03 (57.16, >999.99)***	2.53 (2.15,2.97)***	2.92 (2.44,3.50)***
<b>Race</b>				
White	1.00	1.00	1.00	1.00
Black	1.26 (0.94,1.68)	0.57 (0.41,0.79)**	1.03 (0.88,1.21)	0.65 (0.54,0.79)***
Hispanic	0.85 (0.43,1.66)	0.46 (0.23,0.95)*	0.98 (0.74,1.30)	0.60 (0.42,0.85)**
Other	0.78 (0.30,2.00)	0.63 (0.27,1.46)	1.08 (0.66,1.74)	0.96 (0.56,1.66)
<b>Education</b>				
More than high school	1.00	1.00	1.00	1.00
High school/GED/trade	2.27 (1.68,3.07)***	1.68 (1.19,2.38)**	1.52 (1.28,1.81)***	1.37 (1.14,1.64)**
Less than high school	3.37 (2.38,4.77)***	2.18 (1.40,3.40)**	2.60 (2.20,3.07)***	2.15 (1.71,2.70)***
<b>Income</b>				
≥\$60,000	1.00	1.00	1.00	1.00
\$30,000–\$59,999	1.79 (0.90,3.57)	1.02 (0.47,2.22)	1.44 (1.14,1.82)**	1.23 (0.97,1.57)
\$15,000–\$29,999	6.65 (3.72,11.87)***	2.07 (1.06,4.05)*	2.47 (1.99,3.06)***	1.68 (1.31,2.15)***
<\$15,000	9.78 (5.54,17.29)***	2.10 (1.08,4.07)*	3.02 (2.46,3.71)***	1.79 (1.39,2.31)***
<b>Geographic county residence</b>				
Metropolitan	1.00	1.00	1.00	1.00
Non-metropolitan	1.00 (0.66,1.53)	1.01 (0.61,1.68)	1.28 (1.05,1.57)*	1.21 (0.93,1.57)

Note. OR = Odds ratio; CI = confidence interval; NHATS = National Health and Aging Trends Study.

\*These unstable estimates for ORs and CIs are associated with small cell size. Only three participants were married or living with a partner in the severe social isolation group.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .0001.

from participants with complete information in that they had higher odds of older age, living alone, being a racial minority, having lower education, lower income, and being unmarried. The exclusion of these participants may have led to an underestimation of the prevalence of social isolation. Also, our study does not fully capture participants' life-course and social integration prior to study entry. NHATS relies on self-reported measures, which may introduce bias in comparison to more objective measures of social isolation. The sample is composed of Medicare beneficiaries and therefore does not represent the uninsured or undocumented who might be at greater risk for social isolation. Nevertheless, as the population of older adults

grows and becomes more diverse it is important to understand and identify modifiable risk factors for disability and health outcomes. For example, identifying that individuals who have incomes less than \$30,000 have 2 times the odds of experiencing severe social isolation compared with those with incomes greater than \$60,000 is an important and easily identifiable factor that can aid in the risk stratification of older adults. Additionally, identifying that men compared with women have 4 times the odds of experiencing severe social isolation may lead providers to be more attuned to the social context of men as they age. These findings can assist community-based practitioners in assessing older adults for social isolation risk during their encounters



in clinical visits, in senior centers or based on insurance or housing status.

In conclusion, our results affirm that a significant proportion of older adults experience social isolation and that there are important sociodemographic differences. These results provide important insights and foundational knowledge for future longitudinal analyses, which will be useful in examining how social isolation may influence late-life disability. Additionally, future analysis may employ the National Study of Caregiving, which is a partner study to NHATS, to examine the relationship of caregivers to those socially isolated. Given the potential to modify social isolation through modifications in living arrangement, discussion networks, and social participation, forthcoming analyses from NHATS should provide critical information on strategies to strengthen social relationships and inform policies or interventions that might address this burdensome problem. Our results indicate the importance of contextual factors such as gender, race, income, and education, to understanding patterns of social isolation. Future efforts should elucidate potentially actionable pathways to counteract or prevent social isolation in these at-risk subgroups of older adults.

## Author Contributions

T. K. M. Cudjoe and D. L. Roth contributed for study concept and design, analysis, and interpretation of data. T. K. M. Cudjoe contributed for drafting the manuscript. T. K. M. Cudjoe, D. L. Roth, C. M. Boyd, S. L. Szanton, J. L. Wolff, and R. J. Thorpe Jr. contributed for critical revision of the manuscript.

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## Conflict of Interest

Authors of this manuscript have no relevant conflict of interest.

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