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Social isolation, homebound status, and race among older adults: Findings from the National Health and Aging Trends Study (2011–2019)

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Abstract

Background: Multiple factors may influence the risk of being homebound, including social isolation and race. This study examines the relationship between social isolation and homebound status by race over 9 years in a sample of adults.

Methods: Utilizing a representative sample of 7788 Medicare beneficiaries aged 65+ from 2011–2019, we assessed the odds of becoming homebound by social isolation. We defined social isolation as the objective lack of contact with others. We defined severe social isolation as scoring a 0 or 1 on a social connection scale from 0 to 4. Homebound status was defined as never leaving home or only leaving home with difficulty. Utilizing a multivariate Cox proportional hazards model adjusting for age, gender, marital status, income, and education, we examined the association between social isolation at baseline and becoming homebound during the study in those who were not initially homebound.

Results: Older adults in this study were on average 78 years old. Overall, most were white (69%), female (56.3%), and married (57.8%) and reported that they had a college education or higher (43.9%). Also, at baseline, approximately 25% of study participants were socially isolated, 21% were homebound, and 6.3% were homebound and socially isolated or severely socially isolated. Homebound status at baseline varied by race: Black, 23.9% and white, 16.6% (p < 0.0001). After 9 years, socially isolated black (hazard risk ratio, HRR 1.35, 95% confidence interval CI [1.05,1.73], p < 0.05) and white (HRR 1.25, 95% CI

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[1.09,1.42], p < 0.01) older adults were at higher risk of *becoming* homebound. Conclusion: Socially isolated black and white adults are more likely to be homebound at baseline and become homebound over time. Further research is needed to determine whether community-based strategies and policies that identify and address social isolation reduce homebound status among community-dwelling older adults.

KEYWORDS

homebound, National Health and Aging Trends Study, race, social connection, social isolation

INTRODUCTION

Little progress has been made in overcoming functional health disparities for black Americans as they age. 1-4 Thorpe et al. found that black older adults had more than a 20% greater odds of mobility limitation than white older adults.1 Conceptualizing functional limitations specifically through the lens of homebound status are appreciable for both patients and healthcare practitioners. Additionally, this characterization is particularly relevant considering that social connections may exist or be supported by interactions that occur beyond the home environment. Social isolation is a powerful but often under-recognized risk factor for poor health outcomes, including increased mortality risk, cognitive decline, and functional impairment.⁵ Most epidemiological studies that examine the impact of social isolation on health do not stratify by race.⁵ Prior studies that examine social connection have not used longitudinal data and a large nationally representative sample to investigate the relationship between social isolation and homebound status by race. A large study utilizing data from the National Health Interview Survey found a dose-response effect for survival advantage associated with social integration for white older adults; this effect was weaker for blacks.⁶ This may be due to upstream macrosocial factors (such as racism and public policy) that vary between racial groups. This variation may modulate access to resources that facilitate access to equipment or information that supports physical function.^{7,8}

Estimates from the National Health and Aging Trends Study (NHATS) suggest that approximately 2 million older adults are homebound, and about 1 in 4 older adults are socially isolated. 9,10 Social isolation, an objective measure of the lack of social contact with others,⁵ is a "chronically stressful condition" that accelerates aging.¹¹ Homebound status is characterized by the inability to move beyond the home environment and need for assistive devices or assistance from others to leave

Key points

- Social isolation is an important risk factor for morbidity and mortality.
- · Socially isolated older adults (65 years and older) in the United States are at increased risk for becoming homebound compared to their counterparts that are not socially isolated.

Why does this paper matter?

These findings offer important insights about the role that social connections have on physical health in late-life.

home. 12 Clarifying these relationships would help understand mechanisms on which to develop equitable interventions and policy for all older adults.

We aimed to understand the relationship between social isolation and an older adult's risk for becoming homebound, stratified by black or white race. Our study was informed by a model of how personal resources impact health outcomes⁷ and the National Institutes of Aging Health Disparities Research Framework. 13 We examined the role of race at baseline and throughout 9 years in a community-dwelling group of older adults.

METHODS

Subjects and study design

The National Health and Aging Trends Study (NHATS) is a nationally representative longitudinal cohort of the US population of Medicare beneficiaries aged 65 and above. Baseline data collection began in 2011 and was replenished in 2015. NHATS oversampled individuals

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who self-reported as black non-Hispanic and the oldest age groups. NHATS collected data via annual two-hour in-person interviews by trained interviewers. Participant interviews included assessments of function, economic and health status, and well-being. We drew our sample from 7788 community-dwelling older adults from Round 2011–2019. 14 We excluded 457 older adults due to incomplete responses for the assessment of social isolation. In stratified analyses, we also excluded subjects who reported race or ethnicity groups other than black or white (n = 796).

Measures

Key predictors: Social isolation and race

We characterized the presence and severity of social isolation using the following domains: living with at least 1 other person, talking to 2 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. Older adults received 1 point for each of the aforementioned domains. We classified individuals with a sum score of 0 as severely socially isolated and those with a score of 1 as socially isolated. We classified those with scores of 2 or more as not socially isolated. We classified participants by race based on their self-identification as either black or white non-Hispanic.

Outcome: Homebound status

Our outcome variable was homebound status. 10 We defined homebound as either needing help to leave home or never leaving home in the last month. Nonhomebound participants reported going out at least twice a week without difficulty. We dichotomized the outcome variable into homebound and not homebound groups. Older adults who were homebound at baseline were excluded from longitudinal analysis due to our interest in becoming homebound.

Covariates

Covariates for this study included age (intervals of 5 years), sex (male or female), marital status (married and living with a partner, divorced or separated, widowed or never married), education (none or less than high school [H.S.], HS graduate or equivalent, vocational or

trade diploma, some college and beyond), and total household income (quartiles).

Statistical analysis

Missing values for income were imputed using a hot-deck procedure developed by the NHATS Study team. 15 We used descriptive statistics to characterize the sample by race (Table 1). We conducted bivariate and multivariate logistic regression analysis using baseline measures to assess the odds of being homebound at baseline due to social isolation by race (Table S1). We used multivariate Cox proportional hazards models to examine the effect of social isolation at baseline on becoming homebound over 9 years for the overall sample and by race (Table 2). Sociodemographic covariates are likely interrelated. We used a forward stepwise model-building procedure— Model 1: unadjusted; Model 2: age, sex, marital status: Model 3: age, sex, marital status, income, and education. We censored observations in the Cox model through death, study attrition, or nonhomebound status at the end of the 9th round of data collection.

We tested the proportional hazards assumption using scaled Schoenfeld residuals. 16 Schoenfeld residuals that are graphically centered around 0 indicate the proportional hazard assumption has been met.17 Previous studies found that white older adults had higher odds of being socially isolated and black older adults had higher odds of being homebound. 9,10 Therefore, to examine effects by race, analyses were stratified as black or white. We applied survey weights when specifying the logistic regression and Cox proportional hazards models. We invoked these weights to account for oversampling of blacks and oldest age groups and to adjust for potential nonresponse bias. 18 Analyses were performed using Stata version 15.1.

RESULTS

Cross-sectional relationship between social isolation and homebound status at baseline

A distribution of baseline characteristics by race are shown in Table 1. There were no race differences observed for social isolation at baseline. At baseline, 64.8% of older adults were neither socially isolated nor homebound and 6.3% were socially isolated and homebound (Table S1). The relationships among social isolation and homebound status at baseline by race are shown in Table S2. In unadjusted analyses, socially isolated white older adults had higher odds of being homebound

than white older adults who were not socially isolated. Socially isolated black older adults had higher odds of being homebound than black older adults who were not socially isolated. In adjusted analyses at baseline, white older adults who were socially isolated or severely socially isolated had a higher odds of being homebound

Total^a (%) White (%) Black (%) p valueb Homebound 79.4 Not homebound 83.4 76.1 < 0.0001 Homebound 23.9 20.6 16.6 Social connection No social isolation 75.3 75.5 74.0 0.284 Social isolation 20.4 20.2 20.9 Severe social isolation 4.3 4.3 5.2 Age (years) 0.037 65-69 29.0 28.6 31.2 70-74 25.7 25.0 29.3 75-79 19.0 19.1 17.5 14.6 80-84 14.2 13.1 85-89 8.3 8.7 5.8 90+ 3.8 4.1 3.1 Sex Female 56.3 56.0 59.5 0.037 Male 43.7 44.0 40.5 **Marital status** Unmarried 42.2 40.2 60.9 < 0.0001 Married 57.8 59.9 39.1 Income (US dollars) 0-15,000 23.1 18.5 42.3 < 0.0001 15,000-3 23.9 23.7 24.3 30.000-6 27.1 28.7 21.8 60,000+ 25.9 29.1 11.5 Highest education level 21.1 < 0.0001 Less than high school 16.0 38.4 High School/vocational degree 35.0 36.8 32.4 College or higher 43.9 47.2 29.2 Activities of daily living No difficulty with ADL < 0.0001 81.8 82.8 76.5 Difficulty with one ADL 10.1 10.2 11.3 Difficulty with 2+ ADL 6.6 5.8 10.7 Impairment with 1 or more ADL 1.1 1.1 1.0 Depressive symptoms (PHQ-2) 76.0 69.4 < 0.0001 No depressive symptoms 74.5 Depressive symptoms 25.5 24.1 30.6 Number of medical conditions 0-2 Medical conditions 55.6 50.9 0.001 55.6 3+ Medical conditions 44.4 44.4 49.1

TABLE 1 Distribution of baseline characteristics by race in the National Health and Aging Trends Study (N = 7788)

^aUsing weighted proportions to represent total population, excluding those with dementia.

^bp values are calculated from weighted chi-squared tests.

TABLE 2 Association between social connection and homebound status over a 9-year period stratified by race in the National Health and Aging Trends Study

	Hazard risk ratio (95% Confidence Interval)		
Social connection	Model 1	Model 2	Model 3
Overall			
No social isolation	Reference category		
Social isolation	1.37 (1.21, 1.54)***	1.32 (1.17, 1.49)***	1.25 (1.11, 1.41)***
Severe social isolation	1.78 (1.39, 2.29)***	1.46 (1.15, 1.87)***	1.33 (1.03, 1.70)*
White race			
No social isolation	Reference category		
Social isolation	1.35 (1.18, 1.55)***	1.31 (1.15, 1.49)***	1.25 (1.09, 1.42)**
Severe social isolation	1.85 (1.38, 2.47)***	1.49 (1.13, 1.97)***	1.37 (1.03, 1.83)*
Black Race			
No social isolation	Reference category		
Social isolation	1.48 (1.16,1.87)**	1.49 (1.16, 1.91)*	1.35 (1.05, 1.73)*
Severe social isolation	1.30 (0.81,2.08)	1.17 (0.67, 2.02)	1.09 (0.62, 1.94)

Note: Model 1 unadjusted; Model 2 adjusting for age, sex, marital status; Model 3 adjusting for age, sex, marital status, income, education; $*p < 0.05. **p \le 0.01. ***p \le 0.0001.$

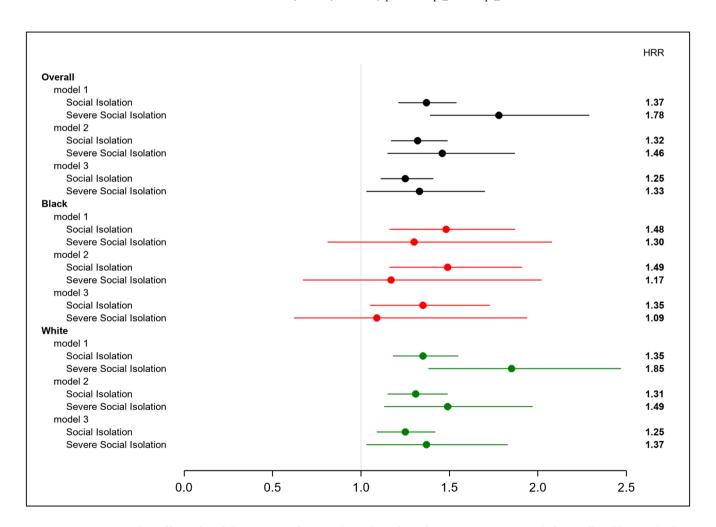


FIGURE 1 Forest plots of hazards risk between social connection & homebound status over a 9-year period: overall and by race in the National Health and Aging Trends Study

(odds ratio (OR) 1.38, 95% CI (1.09, 1.75) and OR 2.70 95% CI (1.54, 4.71), respectively. This relationship was not statistically significant for black older adults.

Longitudinal relationship between social isolation and homebound status

The association between social isolation and becoming homebound over 9 years for all race/ethnic groups and by black/white race is shown in Table 2, and a Forest plot is shown in Figure 1. In Model 1 (unadjusted), white older adults in the severe social isolation and social isolation groups had a higher risk of becoming homebound than white older adults that were not socially isolated. In adjusted Models 2 and 3, white older adults in the severe social isolation and social isolation groups had a higher risk of becoming homebound than white older adults who were not socially isolated. Black older adults in the social isolation group had an increased risk of becoming homebound in Models 1-3. However, the relationship between severe social isolation and becoming homebound was not statistically significant in those models.

DISCUSSION

This study expands understanding of the influences of social isolation on community-dwelling older adults' risk for becoming homebound in the United States over 9 years. After adjusting for sociodemographic factors, we found that socially isolated adults were more likely to become homebound than those not socially isolated. Future research and efforts to address homebound status should consider the role of social connections.

Our study identified social connections as a deciding factor in the functional trajectory of both black and white adults. Prior epidemiologic studies examined risk factors for homebound status 19,20; however, those findings varied regarding the role of social connections on homebound status. Xiang et al found that social isolation increased older adults' homebound trajectory over 7 years.²⁰ However, Ornstein et al. did not find a relationship between social isolation and incident homebound status over 7 years, utilizing a social network question to identity socially isolated older adults. 19 One of the key differences between these two prior studies is that the latter utilized a unidimensional approach to characterize social connection. However, neither study sought to examine whether these relationships varied by race. Overall, most studies do not report effect sizes for social isolation stratified by

race,⁵ this limits our understanding of potential group specific risk between social isolation and health outcomes. Our results advance our understanding by showing that, regardless of race, social isolation increased community-dwelling older adults' risk for becoming homebound over 9 years.

The finding that socially isolated black and white adults had a similar risk for becoming homebound was unexpected. This finding is striking considering prior evidence that suggest that the baseline homebound status risk for black older adults is higher than for white older adults. 10 Prior studies suggest that race is inextricably tied to other macrosocial factors such as socioeconomic status and environmental factors (i.e., poor housing quality). These factors influence downstream outcomes such as function. The literature indicates that certain resiliency factors may develop across a lifetime of chronic stress and economic strain; this could buffer social isolation and its impact on homebound status.21-23 Additionally, the mechanism by which social isolation is associated with becoming homebound requires further examination. The relationship maybe due to reduced gait speed which has a stronger effect on disadvantaged groups, increased risk for sarcopenia which contributes to frailty, increased inactivity due to limited social connection, or poor diet or nutrition. 24-26

We observed that socially isolated black and white adults had an increased risk of becoming homebound. However, though this relationship appeared to be present among white severely socially isolated older adults, it was not statistically significant for black severely socially isolated older adults. This is possibly due to small sample size. Our study was limited by sampling and recall bias. For example, there was an insufficient number of black older adults and even smaller number of individuals classified as Hispanic or other, this impacts our ability to make inferences as it relates to race and social isolation groups. Including black older adults and other underrepresented groups in research is critical to understanding the pathways between social isolation and health outcomes. The annual NHATS survey relied upon measures that required self-report; thus, our findings were subject to recall bias. In addition to including more underrepresented groups in research, future studies should incorporate objective social isolation or homebound status assessments that capture real-time social contact and spatial mobility. This analysis incorporated a multidimensional objective classification of social isolation, longitudinal measure of homebound status, and a representative sample of black and white adults. Inclusion of these factors in future studies might offer further insights

into the pathways between social connections and functional outcomes.

As we contemplate future directions, we are mindful that the current COVID-19 pandemic has increased awareness of social isolation and the role of race on health.²⁷ Such health and social circumstances are a natural experiment that will arguably lead to social isolation and homebound status for many older adults. Future studies should intentionally recruit racially diverse samples of older adults who are socially isolated or at risk for becoming socially isolated.

In conclusion, social isolation negatively impacts white and black older adults by increasing their risk of becoming homebound. It is crucial to raise awareness about the role social isolation plays on function. It is also important that healthcare practitioners began to thoughtfully assess on a routine basis the presence of social isolation and work with these individuals to understand and address this challenge. Additionally, through partnering and designing solutions with older adults and community stakeholders, researchers and policy makers can contribute to the development and sustainability of effective community-based strategies that eliminate social isolation, which could delay the onset of homebound status for older adults.

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CONFLICT OF INTEREST

Authors of this manuscript have no relevant conflict of interest.

AUTHOR CONTRIBUTIONS

Study concept and design, analysis, and interpretation of data: Thomas K. M. Cudjoe, Laura Prichett, Laken C. Roberts Lavigne, Roland J. Thorpe Jr. Drafting: Thomas K. M. Cudjoe. Critical revision: Thomas K. M. Cudjoe, Sarah L. Szanton, Laura Prichett, Laken C. Roberts Lavigne, Roland J. Thorpe Jr.

SPONSOR'S ROLE

None.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

Table S1. Frequency of Social connection and homebound status by race at baseline in the National Health and Aging Trends Study.

Table S2. Association between social connection and homebound status by race at baseline in the National Health and Aging Trends Study.

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