Published in final edited form as:

J Appl Gerontol. 2023 November ; 42(11): 2261–2267. doi:10.1177/07334648231180786.

Examining the Association of Social Isolation and Smoking in Older Adults

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Abstract

BACKGROUND: Tobacco use remains a leading cause of preventable death among older adults, but few studies have examined social isolation as a risk factor for smoking in U.S. older adults.

METHODS: Using National Health and Aging Trends Study (NHATS) data, we conducted multivariate analyses of smoking in a sample of 8,136 adults ages 65 and older.

RESULTS: Social isolation and severe isolation were associated with higher odds of smoking (OR: 2.48 and 5.48, p=0.002 and p<0.001). Individuals with mild (OR: 1.46, p=0.006), moderate (OR: 1.80, p=0.001), or severe (OR: 3.05, p=0.001) symptoms of depression/anxiety also had higher odds of smoking.

CONCLUSIONS: Social isolation is a significant risk factor for smoking in U.S. older adults. Further research is needed to support the development of interventions to reduce social isolation and smoking behavior in older adults.

INTRODUCTION

In 2020, about 9% of older adults (65 years or more) smoked cigarettes in the U.S. (Cornelius et al., 2022). Moreover, smoking prevalence in older adults has not declined over the past 15 years (Kleykamp & Kulak, 2023). Tobacco use remains a leading cause

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Originality disclosure: This manuscript represents original work that is not under review by any other publication. Early findings were presented in November 2021 at the Gerontological Society of America conference. The authors accept full responsibility for the accuracy of all content, including findings and references contained within the manuscript.

COI Disclosures: The authors do not have any conflicts of interest to disclose.

of preventable disease and is a major risk factor for mortality and morbidity in older adults (Gellert et al., 2012; Thun et al., 2013). Research also suggests that smoking may have important links to adverse psychosocial conditions, such as loneliness (Dyal & Valente, 2015). International studies find that smoking is associated with social isolation, though this relationship among older adults in the U.S. is not well understood (Choi & DiNitto, 2015; Christakis & Fowler, 2008; Ikeda et al., 2020; Shankar et al., 2011).

Social isolation among adults ages 65 or older is a growing phenomenon that is defined as an objective lack of social contact and is associated with poor health outcomes including depression, functional impairment, cognitive decline, and mortality (National Academies of Sciences, Engineering, and Medicine, 2020). A recent study found an association between social isolation and higher levels of biological markers for inflammation (interleukin-6 and high sensitivity C-reactive protein) that have long-term consequences for healthy aging (Cudjoe, Selvakumar, et al., 2022).

Past studies of middle-aged adults in the U.S. and England have also found that smokers are more likely to have fewer social connections compared to non-smokers (Holahan et al., 2012; Shankar et al., 2011). As a result, social isolation can persist among smokers after they turn 65 years of age. However, U.S. studies have not used a multi-domain measure of social isolation to examine the association between social isolation and smoking in older age. The purpose of this study was to assess the prevalence of current smoking and the role of social isolation as a modifiable risk factor for smoking behavior in a nationally representative sample of U.S. older adults.

METHODS

Study data and participants

We obtained data from the National Health and Aging Trends Study (NHATS), a publicly available, nationally representative survey administered to approximately 8,500 Medicare beneficiaries ages 65 and older. We included respondents from the initial 2011 wave and the 2015 replenishment sample who were community dwelling and could answer questions without a proxy. We excluded adults in group homes, assisted living facilities, or institutional settings because social isolation measures were not collected for these individuals. Response rates to NHATS questions surpassed 90% each year (DeMatteis et al., 2021), including 92.2% and 95.0% for the social isolation measure in 2011 and 2015, respectively.

Outcome measure

The primary outcome of interest was current cigarette smoking status. Respondents were classified as currently smoking or not based on the question, “Do you smoke cigarettes now?”. Older adults who currently smoked were smoking on average 14.2 cigarettes per day and began using tobacco at about 19.1 years old. Only five individuals who currently smoked had initiated cigarette smoking after turning 65.

Key explanatory variable

Following Cudjoe et al. (2020), we categorized individuals as not socially isolated, socially isolated, or severely isolated based on their living arrangement, core discussion network size, religious attendance, and social participation. One point was assigned 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 clubs, meetings, group activities, or volunteering in the past month. Scores ranged from 0 to 4 where a sum score of zero indicated severe isolation, a score of 1 indicated social isolation, and a score between 2 and 4 indicated social connection.

Covariate measures

Covariates were grounded in a conceptual framework adapted from Holt-Lunstad and Smith (2016) and included demographics, health insurance, mental health, functional status, and chronic conditions. Demographics included sex, age, and race/ethnicity. Depression and anxiety were measured using the 4-item Patient Health Questionnaire (PHQ-4), a composite measure that combines the 2-item PHQ for depression and the 2-item Generalized Anxiety Disorder screening tool (Kroenke et al., 2009). Additional covariates included assistance with activities of daily living (ADLs) and number of chronic illnesses.

Statistical analysis

We used unweighted sample sizes and weighted percentages to describe summary characteristics. A logistic regression examined whether social isolation was associated with increased odds of current smoking, adjusting for demographics and health-related variables. We applied sampling weights to adjust for the complex survey design and produce nationally representative estimates. Analyses were performed using Stata (Version 16, StataCorp, College Station, Texas).

RESULTS

This study included 8,136 adults ages 65 or older, representing a weighted 46,769,778 community-dwelling Medicare beneficiaries in the U.S. About 7.6% of older adults currently smoked. About 79.7% of older adults were not socially isolated, 17.1% were socially isolated, and 3.2% were severely isolated. About 18%, 5%, and 2% of older adults had mild, moderate, or severe symptoms of depression and anxiety (Table 1).

Social isolation was strongly and significantly associated with increased odds of current smoking among older adults (Table 2). Socially isolated individuals had 2.48 greater odds of smoking compared to their counterparts who were not isolated ($p<0.001$). Moreover, individuals classified as severely isolated had 5.48 higher odds of current smoking as compared to respondents who were not isolated ($p<0.001$). Depression and anxiety were also significantly associated with current smoking status. Older adults with mild, moderate, and severe PHQ-4 scores were at 1.46, 1.80, and 3.05 greater odds of smoking, respectively, as compared to those with no depressive symptoms (mild: $p=0.006$; moderate: $p=0.001$; severe: $p=0.001$).

DISCUSSION

In this nationally representative study, older Americans who were socially isolated had more than twice the odds of smoking – and individuals who were severely socially isolated had more than five times the odds of smoking – compared to those who were not socially isolated. These findings reflect prior work showing a positive association between smoking and social isolation among older adults in England and Japan (Ikeda et al., 2020). Additionally, older adults with higher levels of depression and anxiety had greater odds of smoking.

The association between social isolation and smoking suggests two potential pathways. First, smoking may lead to isolation due to social stigma in families or group settings. Second, chronic social isolation in older adults may lead to increased levels of stress, frailty, physical inactivity, or other health behaviors associated with limited social connection. Difficulty leaving the home may further exacerbate social isolation, which can reinforce depression, anxiety, or stress (Cudjoe, Prichett, et al., 2022). Prior studies have shown increased stress levels among socially isolated male rodents, which can increase presynaptic dopamine function and levels of tyrosine hydroxylase that exaggerate dopamine responses to nicotine and addictive substances (Hall et al., 1998; Jones et al., 1990; Robbins et al., 1996; Trainor, 2011).

Second, social isolation may lead to smoking through an association with loneliness. While social isolation is defined as an objective lack of contact with others, loneliness is characterized as a subjective feeling of being alone. Though distinct concepts, social isolation can be a precursor to loneliness, which in turn may lead to smoking for relieving boredom or stress. Similarly, socially isolated older adults lack the social networks that might otherwise diffuse risky behaviors such as smoking (Cornwell & Waite, 2009). For instance, older adults living alone may be more likely to smoke because they do not need to worry about the effects of second-hand smoke on a spouse, grandchild, or adult child living in the household (Galiatsatos et al., 2022). Thus, more interventions to reduce social isolation are needed (Brady et al., 2020).

These findings contribute to the literature in several ways. First, they provide nationally representative evidence on the association of social isolation and current smoking among U.S. older adults. Second, few studies have examined behavioral pathways between social isolation and mortality. The current study finds that social isolation increases the odds of smoking behavior, a significant risk factor for mortality. Third, this study uses an established, multi-domain characterization of social isolation from the NHATS survey (Cudjoe et al., 2020). Prior research has used a subjective, single-item measure of social isolation (Choi & DiNitto, 2015), which may understate the actual prevalence of social isolation.

Additionally, these findings can improve the management of nicotine dependence by understanding the motivations behind smoking behavior. Social isolation may significantly reduce the effectiveness of smoking cessation interventions if it exacerbates an amplified feeling of gain from nicotine intake (Picciotto et al., 1998; Trainor, 2011). For clinicians

assisting in tobacco dependence management with the initial step being smoking cessation, understanding the factors behind a patient's smoking phenotype, such as the role of social isolation, may facilitate more precise interventions (Galiatsatos et al., 2022).

Our study also had several data limitations. First, the lack of smoking incidence in older age cohorts reduced the power and utility of a potential longitudinal analysis. Similarly, the survey did not capture a participant's history of social isolation before turning 65 years old. By taking a cross-sectional approach, we could not make causal inferences. Second, NHATS relies on self-reported measures that likely underestimate smoking behavior. Finally, the data did not have measures on rurality, which may be associated with social isolation and smoking.

In conclusion, our findings provide evidence of a significant association between smoking and social isolation among a nationally representative sample of older adults in the U.S. The link between social isolation and smoking is particularly concerning given that prevalence rates of social isolation rose during the COVID-19 pandemic. Our results yield practical insights for practitioners who might use objective measures of social isolation in screening for smoking and mortality risk. Programs funded by the 2020 Older Americans Act (OAA) reauthorization through area agencies on aging (AAA) can harness social supports to reduce smoking behavior in the community.

Funding disclosures:

Dr. Pomeroy was supported by a National Institute on Aging (NIA) Grant #T32AG066576. Dr. Cudjoe was supported by a National Institute on Aging (NIA) Grant #1K23AG075191.

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What This Paper Adds:

- About 9.0% of older adults in the U.S. are current smokers, while 17.1% were socially isolated and 3.2% were severely isolated in a national sample.
- Social isolation is a risk factor for current smoking among older adults in the U.S.

Applications of Study Findings

- This study provides evidence of a link between social isolation and smoking among older adults and a potential mechanism for early mortality.
- These findings can help to improve management of a patient's nicotine dependence by enhancing our understanding of motivations behind smoking behavior.

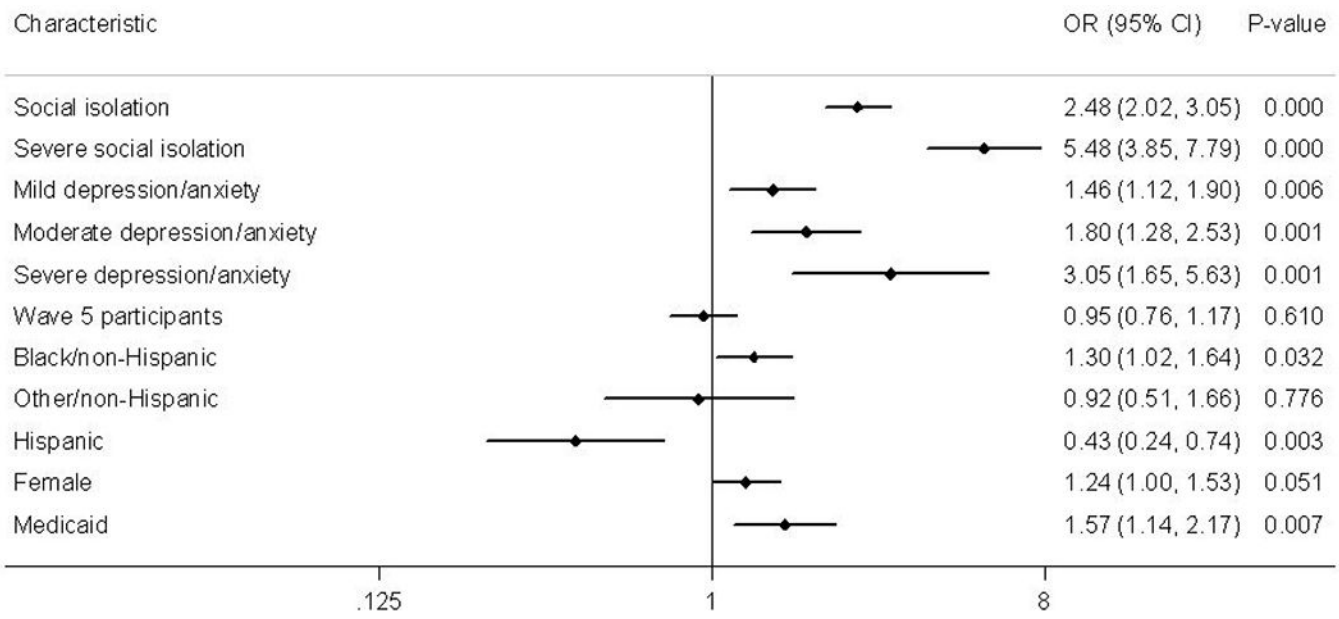

Figure 1. Forest Plot of Adjusted Odds Ratios for Covariates on Current Smoking Status

Notes. Sample size: N = 8,143; OR: Odds ratios (adjusted in the multivariable analysis); Depression/anxiety covariates were measured using the 4-item Patient Health Questionnaire (PHQ-4); Wave 5 participants were respondents included in the 2015 replenishment sample, or who were part of the original 2011 cohort but who did not have data relevant to this study available until 2015; Reference groups include not socially isolated, normal depression/anxiety, Wave 1 participants, White/non-Hispanic, male, and no Medicaid.

Table 1.

Personal Characteristics of Community-Dwelling Older Adults in the National Health and Aging Trends Study (2011 and 2015)

Measure	Unweighted N (Weighted %)
Current smoker	575 (7.64)
Social connection	
No social isolation	6,367 (79.73)
Social isolation	1,476 (17.13)
Severe isolation	293 (3.15)
Wave	
Cohort 1 (Round 1, 2011)	5,365 (54.96)
Cohort 2 (Round 5, 2015)	2,771 (45.04)
Female	4,573 (54.32)
Age (years)	
65 to 69	1,910 (37.11)
70 to 74	1,781 (24.08)
75 to 79	1,709 (18.56)
80 to 84	1,505 (12.12)
85 to 89	808 (5.99)
90 or older	423 (2.14)
Race/ethnicity	
White/non-Hispanic	5,804 (83.05)
Black/non-Hispanic	1,685 (7.65)
Other race/non-Hispanic	202 (3.05)
Hispanic	445 (6.25)
Medicaid	898 (8.11)
Tricare	501 (6.16)
Depression and anxiety [a]	
Normal	5,910 (74.84)
Mild	1,581 (17.92)
Moderate	459 (5.10)
Severe	186 (2.14)
Assistance with ADLs in last month [b]	
No help with ADLs	7,218 (90.90)
Help with one ADL	487 (5.22)
Help with two or more ADLs	431 (3.88)
Chronic health conditions [c]	
No conditions	751 (10.75)
One condition	1,538 (21.18)
Two or more conditions	5,847 (68.07)

Notes. Sample size: N = 8,136; ADLs: activities of daily living.

[a]Depression and anxiety were measured using the four-item Patient Health Questionnaire (PHQ-4).

[b]Activities of daily living (ADLs) include eating, bathing, toileting, dressing, and getting out of bed.

[c]Chronic health conditions include heart attack, heart disease, high blood pressure, arthritis, osteoporosis, diabetes, lung disease, stroke, Alzheimer's disease or related dementias, and cancer.

Table 2.

Adjusted Odds of Smoking among Socially Isolated Community-Dwelling Older Adults

Characteristic	Odds Ratio	95% Confidence Interval	P-Value
Social connection			
No social isolation	Ref.		
Social isolation ***	2.48	2.02 – 3.05	0.002
Severe isolation ***	5.48	3.85 – 7.79	<0.001
Wave			
Cohort 1 (Round 1, 2011)	Ref.		
Cohort 2 (Round 5, 2015)	0.95	0.76 – 1.17	0.610
Female	1.24	1.00 – 1.53	0.051
Age (years)			
65 to 69	Ref.		
70 to 74	0.84	0.65 – 1.10	0.207
75 to 79 ***	0.54	0.39 – 0.75	<0.001
80 to 84 ***	0.31	0.22 – 0.43	<0.001
85 to 89 ***	0.07	0.03 – 0.15	<0.001
90 or older ***	0.09	0.03 – 0.24	<0.001
Race/ethnicity			
White/non-Hispanic	Ref.		
Black/non-Hispanic *	1.30	1.02 – 1.64	0.032
Other race/non-Hispanic	0.92	0.51 – 1.66	0.776
Hispanic **	0.43	0.24 – 0.74	0.003
Medicaid **	1.57	1.14 – 2.17	0.007
Tricare	1.13	0.76 – 1.68	0.547
Depression and anxiety [a]			
Normal	Ref.		
Mild **	1.46	1.12 – 1.90	0.006
Moderate ***	1.80	1.28 – 2.53	0.001
Severe ***	3.05	1.65 – 5.63	0.001
Assistance with ADLs in last month [b]			
No help with ADLs	Ref.		
Help with one ADL	0.67	0.40 – 1.13	0.130
Help with two or more ADLs	0.69	0.34 – 1.42	0.309
Chronic health conditions [c]			
No conditions	Ref.		
One condition	1.11	0.75 – 1.62	0.602
Two or more conditions	0.88	0.61 – 1.26	0.474

Notes. Sample size: N = 8,136; Ref: reference group; ADLs: activities of daily living. All reported odds ratios are adjusted.

[a] Depression and anxiety were measured using the four-item Patient Health Questionnaire (PHQ-4).

[b] Activities of daily living (ADLs) include eating, bathing, toileting, dressing, and getting out of bed.

[c] Chronic health conditions include heart attack, heart disease, high blood pressure, arthritis, osteoporosis, diabetes, lung disease, stroke, Alzheimer's disease or related dementias, and cancer.

* Significant at $p < 0.05$.

** Significant at $p < 0.01$.

*** Significant at $p \leq 0.001$.