

Prevalence and Correlates of Social Isolation Among Older Adults in Subsidized Housing

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Abstract

Background and Objectives: Social isolation is an increasing public health concern. Older residents in subsidized housing may be susceptible to isolation given high rates of chronic illness/disabilities, low income, and living alone. This cross-sectional study examined correlates of social isolation among over 3,000 older adults from nearly 100 subsidized housing communities across the United States.

Research Design and Methods: Respondent Lubben Social Network Scale-6 scores, demographic data, and health information were collected in 2019 by a nonprofit housing organization and linked to the Neighborhood Atlas Area Deprivation Index. Associations between social isolation and other variables were assessed using logistic regression.

Results: The mean respondent age was 75.9 years; 67% were female, 33% were male, 38.8% were White, 15.5% were Black, 78% were Hispanic, and 27.5% were Asian. Among all respondents, 29.8% were isolated. Adjusting for demographics, multilevel logistic regressions demonstrated significant associations between isolation and poor self-rated health, functional impairment, mental health distress, and knowing/relying on fewer neighbors.

Discussion and Implications: This study sheds light on the prevalence and correlates of social isolation among older adults who live in subsidized housing managed by a large nonprofit housing organization. The findings from this study suggest that contextual and structural factors must be further investigated to better understand social isolation among older subsidized housing residents. Ultimately, this work informs efforts to identify socially isolated older adults and evidence-based interventions to address this public health concern.

Keywords: ADI, Affordable housing, Disadvantage, Disparities, Loneliness

Background and Objectives

Social connection is a critical factor for healthy aging. Social isolation in older populations is a growing public health concern as older adults increasingly live alone (World Health Organization, 2021). Social isolation is defined as an objective lack of social contact and is related to but distinct from loneliness, a subjective feeling of being alone (National Academies of Sciences, 2020). Both are well-established risk factors for a variety of adverse health outcomes, including functional decline and frailty (Cudjoe et al., 2022; National Academies of Sciences, 2020; Pomeroy et al., 2023), cardiovascular disease and stroke (National Academies of Sciences, 2020; Pomeroy et al., 2023), mental health conditions (National Academies of Sciences, 2020; Pomeroy et al., 2023; Taylor, 2021), cognitive decline and dementia (Cudjoe et al., 2022; National Academies of Sciences, 2020; Pomeroy et

al., 2023), nursing home placement (National Academies of Sciences, 2020; Pomeroy et al., 2023), and morbidity/mortality (Cudjoe et al., 2022; National Academies of Sciences, 2020; Pomeroy et al., 2023).

The National Academies of Science, Engineering, and Medicine's social isolation and health model which informs this work posits there are bidirectional biopsychosocial pathways that link risk factors—including old age or socioenvironmental circumstances—to social connection through potential mediators of certain health impacts and mortality (National Academies of Sciences, 2020). Umberson and Donnelly (2023) extend this theoretical framing, elevating the importance of a life-course perspective. In addition, they emphasize the role of structural systems related to race and gender (such as racism and sexism) which parallel the upstream “macro” factors detailed in Berkman et al.'s conceptual model of how social networks impact health (Berkman et al., 2000).

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Despite strides in the broader literature on social connection and health, designing actionable and tailored interventions requires a greater focus on studies of populations at risk for social isolation. For example, research on loneliness demonstrates that young adults, single parents, individuals with disabilities or mental illness, and veterans experience elevated levels of isolation; by identifying at-risk populations, interventions to buffer and reduce isolation and its effects can be appropriately tailored for those groups (Smith et al., 2023). Similar work is needed to identify other subpopulations at risk for social isolation and the factors that predispose them to isolation.

Social isolation is of particular concern for the over two million American older adults who receive federal housing subsidies (Center on Budget and Policy Priorities, 2022). Housing subsidies are intended to benefit older adults by reducing the financial stresses associated with housing instability. Given that the current cohort of older Americans has high debt and insufficient savings, the number of older adults in need of subsidized housing is growing (Fernald, 2014). In order to be eligible for housing subsidies, a household must have an income below a certain income threshold and not inhabit more than one residence (U.S. Department of Housing and Urban Development, 2013). Compared with households living in conventional housing, those in subsidized housing are more likely to be headed by a female, identify as Black or Hispanic, live in high-poverty areas (National Low Income Housing Coalition, 2012), and include at least one older adult, person with a disability, and/or child (Center on Budget and Policy Priorities, 2022; National Low Income Housing Coalition, 2012). Across the United States, subsidized housing is more prevalent in northeastern states and Louisiana, and less prevalent in noncoastal western states and Florida (USAFacts, 2023). Many of these northeastern states are noted to have higher proportions of older adults who live alone, while many of these western states have lower proportions of older adults who live alone (National Opinion Research Center at the University of Chicago, 2021).

In theory, housing subsidies can help improve older adults' physical and mental health by allowing them to shift more financial resources from housing costs toward health needs. Furthermore, the collocated nature of many subsidized housing units may provide an avenue to foster social connection. However, despite the anticipated benefits of housing subsidies, older adults living in subsidized housing have reported substantial challenges to their physical, mental, social, and financial health (National Academies of Sciences, 2020; Pomeroy et al., 2021), and studies have suggested that older adult residents of subsidized housing communities may have higher rates of social isolation and loneliness than those who live in conventional housing (Gonyea et al., 2018; National Academies of Sciences, 2020; Taylor et al., 2016, 2018).

For this growing population, various individual-level socioeconomic and health characteristics may increase the risk of social isolation while also exacerbating the downstream effects of isolation on health. Compared with older adults living in conventional housing, those in subsidized housing are more likely to face financial hardship, a risk factor for social isolation (Cudjoe, 2023; Cudjoe et al., 2020; Menec et al., 2019; National Academies of Sciences, 2020) and loneliness (Cohen-Mansfield et al., 2016; Ferreira-Alves et al., 2014; Menec et al., 2019). Subsidized housing residents also live alone at higher rates than the general population and

are less likely to have access to a family caregiver (Gibler, 2003; Gonyea et al., 2018; Pomeroy et al., 2021; Taylor et al., 2018). Furthermore, from a physical and mental health standpoint, residents of subsidized housing experience higher levels of disability and chronic illness, worse access to affordable healthcare (Gibler, 2003; Pomeroy et al., 2023), more depressive symptoms, and greater substance use (Cummings et al., 2013; Simning et al., 2012) that could further predispose them to social isolation.

The environmental context of the neighborhoods where many subsidized housing communities are located may also deter or facilitate social activity or community engagement. Past research suggests that these buildings are often located in areas that are more socioeconomically deprived, which in turn leads to higher rates of loneliness (De Koning et al., 2017; Scharf & De Jong Gierveld, 2008; Taylor et al., 2018; Victor & Pikhartova, 2020). Many neighborhood characteristics that may be more widespread in socioeconomically deprived areas, including increased levels of litter (Portacolone et al., 2018; Wee et al., 2019), poor walkability (Portacolone et al., 2018), inadequate street lighting (Wee et al., 2019), lack of green space (Kemperman & Timmermans, 2014), limited access to transportation (Pomeroy et al., 2021; van den Berg et al., 2016), pronounced discrimination, and exposure to violence or crime (Portacolone et al., 2018), may worsen social isolation by limiting or discouraging social interactions with neighbors.

The various individual and environmental characteristics associated with older subsidized housing residents and their neighborhoods may impede social connection, leaving them more susceptible to social isolation and its adverse consequences. Interventions to address social isolation may benefit from a deeper understanding of the populations most at risk and the characteristics that contribute to this risk.

As such, this study aimed to (1) estimate the prevalence of social isolation in a large sample of older adults living in subsidized housing communities across the United States, (2) utilize mixed multilevel multivariate logistic regression analyses to identify important demographic, health, and social factors associated with being socially isolated in this population, and (3) assess the relationship between housing community area deprivation and social isolation in this population. Through this work, we seek to advance our understanding of the psychosocial health of older subsidized housing residents, aiding efforts to identify populations at risk for social isolation and guide evidence-based practice and interventions.

Research Design and Methods

Data Sample and Sources

This study used data from resident intake surveys and routine health interviews conducted in 2019 by a large nonprofit subsidized housing developer and management organization in the United States (Mercy Housing, 2022). De-identified individual responses were collected for 3,822 older adult residents from 94 subsidized housing communities in 13 states across the United States (Arizona, California, Colorado, Georgia, Idaho, Illinois, Kentucky, Missouri, North Carolina, Ohio, Tennessee, Washington, and Wisconsin). The data set includes information about respondents' demographics, health, and social connections to assess individual-level factors. In addition to individual-level data, our study included housing site addresses for the subsidized housing

communities, which were integrated with area deprivation data from the Neighborhood Atlas Area Deprivation Index v3.1 (ADI; Kind & Buckingham, 2018). The Johns Hopkins Institutional Review Board (IRB) determined this research study (IRB00257366) was IRB-exempt due to the de-identified nature of the data.

Measures

Demographic variables included respondents' age, gender (male or female), and racial/ethnic identity (non-Hispanic White, non-Hispanic Black, Hispanic, Asian, or other/unknown), as well as additional information on each respondent's household role (head/co-head of household, spouse, or other) to better understand resident family dynamics.

Health interview data included self-rated health, disability status, functional ability, mental health, and healthcare utilization. Self-rated health was subjectively assessed as excellent, very good, good, fair, or poor, based on the Centers for Disease Control and Prevention (CDC) Healthy Days Measures questionnaire (Moriarty et al., 2003). Disability status was determined based on whether a respondent had a documented disability, as defined by the Americans with Disabilities Act (U.S. Congress, 1990, 2008). Functional ability was assessed based on an individual's level of impairment for independently managing six activities of daily living (ADLs)—which included bathing, dressing, toileting/continence, transferring, grooming, and feeding (Katz, 1983)—as well as eight instrumental activities of daily living (IADLs)—which included managing medications, using the telephone, shopping, preparing food, housekeeping, arranging transportation, doing laundry, and handling finances (Katz, 1983; Lawton & Brody, 1969). Mental health information included the self-reported number of days in the last 30 days that respondents experienced mental health distress, as defined by the CDC Healthy Days Measures assessment (Moriarty et al., 2003), and whether they requested help for mental/emotional health at the time of the health interview. Healthcare utilization information included each respondent's number of emergency room visits in the last 12 months and the number of hospitalizations in the last 12 months.

The key outcome variable in this study was social isolation, which was measured using the Lubben Social Network Scale (LSNS-6; Lubben et al., 2006). The LSNS-6 is an abbreviated version of the LSNS, a composite scale for measuring social networks in older adults (Lubben, 1988). The LSNS is informed by the Berkman–Syme Social Network Index, which uses factors such as marital status, close relationships, religious attendance, and social participation to evaluate an individual's social isolation (Berkman & Syme, 1979). As part of the LSNS-6, respondents were asked about their ties with relatives and friends. Responses were assigned point values and categorized based on the established LSNS-6 cutoff criteria. A score of less than 12 out of 30 on the LSNS-6 typically indicates social isolation (Lubben et al., 2006). Additionally, two validated collective efficacy assessment questions examined respondents' perceptions of their relationships with neighbors as additional covariates to further characterize each respondent's neighborhood engagement and social connections beyond interactions with relatives and friends. These variables captured how many neighbors the respondent knew and how many neighbors they could rely on for assistance (Cagney et al., 2009).

From there, the subsidized housing site addresses were linked to the ADI national data set using ArcGIS to determine relative area deprivation (Kind & Buckingham, 2018) as a contextual covariate. The Neighborhood Atlas ADI integrates U.S. Census data on various aspects of area deprivation, including education, employment, quality of housing, and poverty, into a single numerical measure of neighborhood-level disadvantage. Area deprivation rankings and statewide and nationwide comparisons were computed (Kind & Buckingham, 2018; Kind et al., 2014; Singh, 2003; University of Wisconsin School of Medicine and Public Health, 2021a). The ADI values in this study use 2015–2019 5-year estimates from the U.S. Census's American Community Survey (University of Wisconsin School of Medicine and Public Health, 2021b) and are expressed as national percentile rankings. Lower ADI rankings correspond to less disadvantaged census block groups, and higher ADI rankings correspond to more disadvantaged ones (University of Wisconsin School of Medicine and Public Health, 2021a). Based on previously published work using the ADI, housing sites with ADI values in the top 15% of the sample were considered to be the most disadvantaged group, whereas ADI values in the bottom 85% of the sample were considered to be the least disadvantaged group (Kind et al., 2014).

Statistical Analysis

Descriptive statistics were conducted for the individual-level and ADI data to better understand our sample's spectra of older adult residents and subsidized housing site locations. Demographic, health, and social characteristics were compared for older subsidized housing residents who were and were not socially isolated using *t*-tests for continuous data and chi-squared tests for categorical data.

A series of mixed multilevel univariate logistic regression models were used to identify individual-level correlates of social isolation from the demographic and health measures. Additionally, mixed multilevel multivariate logistic regression models were estimated for each of the demographic, health, and social measures, adjusting for age, gender, and race/ethnicity, producing a series of odds ratios (ORs) and 95% confidence intervals (CIs). Housing communities were treated as an additional nested level within the models to account for the potential clustering of characteristics and responses by housing sites. Statistical analyses were performed using Stata statistical software (Version 17.0, StataCorp, College Station, TX).

Results

Of the original 3,822 survey and interview respondents, 3,496 completed the LSNS-6. Two of the 94 housing sites were unable to collect social isolation information. Another two housing sites' data had been merged into a single corresponding site in the data set before data analysis, leaving 91 sites with completed individual-level social isolation data; the number of individual LSNS-6 responses collected per housing site ranged between 1 and 138. One additional housing site could not be linked to an ADI value due to limitations in the Neighborhood Atlas ADI data set, leaving a sample of 90 housing sites with corresponding ADI values and individual-level social isolation data. ADI values ranged from 1 to 97; 14 housing sites had ADI values included in the most disadvantaged 15% of our sample, whereas 76 housing sites had ADI

Table 1. Characteristics of Older Subsidized Housing Residents in 2019, by Social Isolation Status

Characteristic	Response	All	Not isolated	Socially isolated
N		3,496	2,455 (70.2%)	1,041 (29.8%)
Age	Mean (SD)	75.9 (8.6)	76.0 (8.5)	75.9 (8.9)
Gender	Female	2,328 (67.0%)	1,729 (70.8%)	599 (58.0%)
	Male	1,147 (33.0%)	713 (29.2%)	434 (42.0%)
Race/ethnicity	NH White	1,357 (38.8%)	853 (34.7%)	504 (48.4%)
	NH Black	542 (15.5%)	390 (15.9%)	152 (14.6%)
	Hispanic	272 (7.8%)	198 (8.1%)	74 (7.1%)
	Asian	961 (27.5%)	761 (31.0%)	200 (19.2%)
	Other/Unknown	364 (10.4%)	253 (10.3%)	111 (10.7%)
Household role	Head/Co-head	3,138 (89.8%)	2,175 (88.6%)	963 (92.5%)
	Spouse	345 (9.9%)	275 (11.2%)	70 (6.7%)
	Other	13 (0.4%)	5 (0.2%)	8 (0.8%)
Self-rated health	Excellent	228 (6.5%)	173 (7.0%)	55 (5.3%)
	Very good	623 (17.8%)	448 (18.2%)	175 (16.8%)
	Good	1,507 (43.1%)	1,118 (45.5%)	389 (37.4%)
	Fair	679 (19.4%)	441 (18.0%)	238 (22.9%)
	Poor	310 (8.9%)	185 (7.5%)	125 (12.0%)
Has disability		420 (12.0%)	282 (11.5%)	138 (13.3%)
Difficulty with ADLs total	Mean (SD)	0.3 (0.9)	0.3 (0.8)	0.5 (1.1)
Difficulty with IADLs total	Mean (SD)	1.1 (1.7)	0.9 (1.6)	1.4 (1.9)
ER visits in last year	0 times	2,340 (66.9%)	1,650 (67.2%)	690 (66.3%)
	1 time	589 (16.8%)	421 (17.1%)	168 (16.1%)
	2 or more times	492 (14.1%)	328 (13.4%)	164 (15.8%)
Hospital visits in last year	0 times	2,602 (74.4%)	1,856 (75.6%)	746 (71.7%)
	1 time	486 (13.9%)	338 (13.8%)	148 (14.2%)
	2 or more times	232 (6.6%)	148 (6.0%)	84 (8.1%)
Requested help for MH needs		347 (9.9%)	206 (8.4%)	141 (13.5%)
MH distress days in last 30 days	Mean (SD)	4.4 (7.7%)	4.0 (7.3%)	5.4 (8.6%)
Know neighbors	Most	1,041 (29.8%)	822 (33.5%)	219 (21.0%)
	Some	1,110 (31.8%)	800 (32.6%)	310 (29.8%)
	Few	656 (18.8%)	418 (17.0%)	238 (22.9%)
	None	63 (1.8%)	35 (1.4%)	28 (2.7%)
Can rely on neighbors	Most	522 (14.9%)	421 (17.1%)	101 (9.7%)
	Some	992 (28.4%)	754 (30.7%)	238 (22.9%)
	Few	940 (26.9%)	657 (26.8%)	283 (27.2%)
	None	396 (11.3%)	230 (9.4%)	166 (15.9%)
ADI	Bottom 85%	3,260 (94.5%)	2,304 (95.1%)	956 (93.0%)
	Top 15%	190 (5.5%)	118 (4.9%)	72 (7.0%)

Notes: ADI = Area Deprivation Index; ADL = activities of daily living; ER = emergency room; IADL = instrumental activities of daily living; MH = mental health; NH = non-Hispanic; SD = standard deviation.

N = 3,496 residents. Responses answered as “not applicable” or “unsure” not displayed. Missing observations include *n* = 41 for age, *n* = 21 for gender, *n* = 46 for ADI, and *n* = 1,421 for days of mental health distress. Values listed represent *n* (%), except when indicated for continuous scores, where means and standard deviations are shown. Social isolation was measured through the abbreviated Lubben Social Network Scale (LSNS-6), with scores ranging from 0 to 30 and lower scores indicating more severe social isolation. Respondents with an LSNS-6 score <12 were characterized as socially isolated in analyses.

values included in the least disadvantaged 85% of the sample. Complete case analysis was utilized, which excluded observations with missing data for variables of interest—individual responses without LSNS-6 scores were excluded from social isolation analyses, and similarly, housing sites without corresponding social isolation data or ADI data were excluded from ADI analysis.

Table 1 lists the demographic characteristics of the sample population. Mean and median ages were 75.9 and 75.5

years, respectively, with 67.0% female, 33.0% male, 38.8% non-Hispanic White, 15.5% non-Hispanic Black, 7.8% Hispanic, and 27.5% Asian. 89.8% of respondents identified as the head/co-head of their household. Among the 3,496 respondents who completed the LSNS-6, 29.8% were socially isolated. Additionally, about 90% of respondents lived alone, and about 90% had access to healthcare. The table also includes further information about respondents' health and social connections. When respondents were asked to rate

their health, 6.5% rated their health as excellent, 17.8% as very good, 43.1% as good, 19.4% as fair, and 8.9% as poor. Regarding healthcare utilization, 30.9% reported at least one emergency room visit in the past year, and 20.5% had at least one hospitalization in the past year. For mental health, 9.9% requested help for mental/emotional health needs at the time of the interview. When respondents were asked about their relationships with neighbors, 29.8% indicated they knew most neighbors, 31.8% knew some neighbors, 18.8% knew few neighbors, and 1.8% did not know any of their neighbors; additionally, 14.9% indicated they could rely on most neighbors, 28.4% could depend on some neighbors, 26.9% could rely on few neighbors, and 11.3% could not rely on any of their neighbors. Prior to the mixed multilevel analysis to account for potential clustering of responses by housing site, the following variables were found to have statistically significant correlations with social isolation: gender, race/ethnicity, household role, self-rated health, total number of ADLs and IADLs which an individual had difficulty with, number of hospitalizations in the last year, requesting help for mental/emotional health needs at the time of the interview, number of days of mental health distress in the last 30 days, relationships with neighbors, and area deprivation.

Table 2 shows the results of unadjusted and adjusted mixed multilevel logistic regression analyses. Adjusting for demographic variables (age, gender, race/ethnicity), male gender (OR = 1.81, 95% CI: 1.53–2.14), poor self-rated health (OR = 2.38, 95% CI: 1.55–3.65), difficulty with ADLs (OR = 1.23, 95% CI: 1.13–1.35), difficulty with IADLs (OR = 1.15, 95% CI: 1.10–1.22), and increased number of mental health distress days in the last 30 days (OR = 1.02, 95% CI: 1.01–1.04) were each independently associated with higher odds of social isolation. Additionally, compared with white respondents, Black (OR = 0.67, 95% CI: 0.49–0.92), Hispanic (OR = 0.46, 95% CI: 0.33–0.65), and Asian (OR = 0.39, 95% CI: 0.30–0.51) respondents had lower odds of social isolation. Individuals who did not request help for mental/emotional health needs (OR = 0.55, 95% CI: 0.42–0.72) had lower odds of social isolation. Lastly, individuals who knew no neighbors (OR = 2.93, 95% CI: 1.62–5.30) or who could rely on no neighbors (OR = 3.21, 95% CI: 2.33–4.43) had higher odds of social isolation.

Discussion and Implications

This large-scale cross-sectional study of older adults residing in subsidized housing communities around the United States finds that nearly one in three older adults living in subsidized housing communities are socially isolated. This sample's overall prevalence of social isolation is slightly higher than previously reported values for older adults residing in subsidized housing (Taylor et al., 2016) and for other community-dwelling older adults (Cudjoe et al., 2020).

Higher odds of social isolation were found among respondents who identified as White males, as well as those with poorer self-rated health, greater functional impairment, greater mental/emotional health distress, and fewer ties to neighbors, suggesting that assessment for these characteristics could play a potential role in helping identify socially isolated older adults in subsidized housing settings. These findings echo similar results from other studies which have found social isolation to exhibit associations with gender (Cudjoe et al., 2020; Menec et al., 2019), racial/ethnic identification (Cudjoe et al., 2020), poorer self-rated health

(Taylor, 2021), functional impairment (Cudjoe et al., 2022; Menec et al., 2019; Pomeroy et al., 2023), and poor mental health (National Academies of Sciences, 2020; Taylor, 2021). However, to our knowledge, no previous studies on older adults who live in subsidized housing have explicitly assessed for associations between social isolation and perceptions of knowing or being able to rely on neighbors.

The finding that area deprivation was only a statistically significant risk factor for social isolation in the initial chi-squared unadjusted analysis is surprising and warrants further investigation, as it appears to differ from previous findings suggesting that local area socioeconomic disadvantage may be associated with increased prevalence of social isolation and loneliness in older adults (De Koning et al., 2017; Menec et al., 2019; Scharf & De Jong Gierveld, 2008; Victor & Pikhartova, 2020). Given that gender and race/ethnicity were each found to have statistically significant associations with isolation, one possible confounder could be that certain gender or racial/ethnic groups may have been more prevalent in areas with greater deprivation; another consideration is that residents of economically disadvantaged areas—particularly areas with greater populations of racial/ethnic minorities—can adapt to adverse circumstances by developing stronger social networks (Mattis et al., 2008). Alternatively, it may be that the ADI did not adequately reflect socioeconomic disadvantage in subsidized housing settings—many subsidized housing communities are made up of large multistory buildings that are separate from the surrounding area and almost function as their own neighborhoods, and thus these may not be representative of the environments that the ADI was designed to measure. Of note, it is also unclear why there were inconsistent findings for disability status and having more hospitalizations over the last year, as increased functional impairment with ADLs and IADLs did consistently have statistically significant relationships with social isolation after accounting for clustering and adjusting for demographic factors. In the case of household roles, a possible reason for the observed discrepancy between the unadjusted and adjusted analyses is that males could have been more inclined to self-identify as head of the household.

Overall, the findings from this study help shed light on the phenomenon of social isolation among older subsidized housing residents. In theory, housing subsidies are intended to improve older adults' physical and mental health by reducing the stresses associated with housing instability and economic burden and allowing residents to shift financial resources toward other needs. Further, the collocated nature of many subsidized housing units may provide an avenue to foster social connection. However, increasing levels of debt and insufficient savings among older adults are likely to exacerbate the need for subsidized housing and offset the potential financial benefits that subsidies afford (Fernald, 2014). Despite the anticipated benefits of housing subsidies, subsidized housing residents have reported substantial challenges to their physical, mental, social, and financial health (National Academies of Sciences, 2020; Pomeroy et al., 2021). Previous studies have suggested that older adult residents of subsidized housing communities may have higher rates of social isolation and loneliness than those who live in conventional housing (Gonyea et al., 2018; National Academies of Sciences, 2020; Taylor et al., 2016, 2018), underscoring the importance of further investigation of this at-risk population.

Table 2. Factors Associated with Social Isolation among Older Subsidized Housing Residents in 2019

Characteristic	Response	Unadjusted OR (95% CI)	<i>p</i>	Adjusted OR (95% CI) ^a	<i>p</i>
Age		1 (0.99–1.01)	.657	1 (0.99–1.01)	.526
Gender	Female	<i>Ref.</i>		<i>Ref.</i>	
	Male	1.79 (1.52–2.11) ^{***}	<.001	1.81 (1.53–2.14) ^{***}	<.001
Race/ethnicity	NH White	<i>Ref.</i>		<i>Ref.</i>	
	NH Black	0.7 (0.51–0.94) [*]	.020	0.67 (0.49–0.92) [*]	.012
	Hispanic	0.45 (0.32–0.63) ^{***}	<.001	0.46 (0.33–0.65) ^{***}	<.001
	Asian	0.41 (0.31–0.53) ^{***}	<.001	0.39 (0.30–0.51) ^{***}	<.001
	Other/Unknown	0.62 (0.46–0.85) ^{**}	.003	0.61 (0.44–0.83) ^{**}	.002
Household role	Head/Co-head	<i>Ref.</i>		<i>Ref.</i>	
	Spouse	0.59 (0.43–0.79) ^{***}	<.001	0.78 (0.57–1.07)	.121
	Other	6.57 (1.89–22.89) ^{**}	.003	6.3 (1.77–22.51) ^{**}	.005
Self-rated health	Excellent	<i>Ref.</i>		<i>Ref.</i>	
	Very good	1.33 (0.91–1.94)	.137	1.41 (0.96–2.08)	.084
	Good	1.24 (0.87–1.76)	.243	1.35 (0.93–1.95)	.109
	Fair	1.96 (1.35–2.85) ^{***}	<.001	2.11 (1.43–3.10) ^{***}	<.001
	Poor	2.34 (1.54–3.54) ^{***}	<.001	2.38 (1.55–3.65) ^{***}	<.001
Has disability		1.45 (1.09–1.91) [*]	.010	1.28 (0.96–1.71)	.091
Difficulty with ADLs total		1.22 (1.12–1.32) ^{***}	<.001	1.23 (1.13–1.35) ^{***}	<.001
Difficulty with IADLs total		1.14 (1.09–1.20) ^{***}	<.001	1.15 (1.10–1.22) ^{***}	<.001
ER visits in last year	0 times	<i>Ref.</i>		<i>Ref.</i>	
	1 time	0.95 (0.76–1.17)	.623	0.93 (0.75–1.16)	.520
	2 or more times	1.16 (0.93–1.46)	.195	1.12 (0.89–1.42)	.332
Hospital visits in last year	0 times	<i>Ref.</i>		<i>Ref.</i>	
	1 time	1.04 (0.83–1.30)	.750	0.96 (0.76–1.22)	.764
	2 or more times	1.39 (1.03–1.88) [*]	.031	1.33 (0.97–1.81)	.072
Requested help for MH needs	Yes	<i>Ref.</i>		<i>Ref.</i>	
	No	0.55 (0.43–0.72) ^{***}	<.001	0.55 (0.42–0.72) ^{***}	<.001
MH distress days in last 30 days		1.02 (1.01–1.03) ^{**}	.004	1.02 (1.01–1.04) ^{**}	.002
Know neighbors	Most	<i>Ref.</i>		<i>Ref.</i>	
	Some	1.62 (1.30–2.01) ^{***}	<.001	1.66 (1.33–2.08) ^{***}	<.001
	Few	2.27 (1.79–2.88) ^{***}	<.001	2.34 (1.83–3.00) ^{***}	<.001
	None	3.03 (1.73–5.33) ^{***}	<.001	2.93 (1.62–5.30) ^{***}	<.001
Can rely on neighbors	Most	<i>Ref.</i>		<i>Ref.</i>	
	Some	1.41 (1.07–1.87) [*]	.015	1.41 (1.07–1.87) [*]	.015
	Few	2.03 (1.54–2.68) ^{***}	<.001	2.03 (1.54–2.68) ^{***}	<.001
	None	3.21 (2.33–4.43) ^{***}	<.001	3.21 (2.33–4.43) ^{***}	<.001
ADI	Bottom 85%	<i>Ref.</i>		<i>Ref.</i>	
	Top 15%	1.67 (0.81–3.43)	.166	1.52 (0.73–3.16)	.264

Notes: *N* = 3,496 residents. Responses answered as “not applicable” or “unsure” not displayed. Missing observations include *n* = 41 for age, *n* = 21 for gender, *n* = 46 for ADI, and *n* = 1,421 for days of mental health distress. Social isolation was measured through the abbreviated Lubben Social Network Scale (LSNS-6), with scores ranging from 0 to 30 and lower scores indicating more severe social isolation. Respondents with an LSNS-6 score <12 were characterized as socially isolated in analyses. ADI = Area Deprivation Index; ADL = activities of daily living; CI = confidence interval; ER = emergency room; IADL = instrumental activities of daily living; MH = mental health; NH = non-Hispanic; OR = odds ratio; Ref = reference.

^aAdjusted for age, gender, and race/ethnicity, with the following exceptions: the model for age was only adjusted for gender and race/ethnicity, the model for gender was only adjusted for age and race/ethnicity, and the model for race/ethnicity was only adjusted for age and gender.

^{*}Difference between older adults who are socially isolated and not socially isolated is significant at *p* < .05.

^{**}Difference between older adults who are socially isolated and not socially isolated is significant at *p* < .01.

^{***}Difference between older adults who are socially isolated and not socially isolated is significant at *p* < .001.

Building on the work of previous studies, this work has several notable strengths. Our sample consisted of a sizable population of older adults in subsidized housing—including a significant number of Asian older adults, who remain an underrepresented and understudied demographic in the literature on social isolation (Jang et al., 2022)—as well as a

large number of subsidized housing communities from many different regions of the United States. We utilized a validated measure of social isolation, the LSNS-6, and integrated questions about residents’ perceptions of and relationships with their neighbors for a more comprehensive assessment of residents’ social connections. We also leveraged the ADI

in order to assess neighborhood-level disadvantage for the different subsidized housing communities. The high prevalence of social isolation in our sample compared to other community-dwelling older adult populations is notable, given that these older adults were in a congregate setting which had some infrastructure and resources available to facilitate social interaction between residents. The concordance of findings in this data set with other nationally available data further strengthens the role and value of examining data sets that are created by community-based practitioners.

Our study also has several limitations. Our analyses utilize data from survey/interview responses, which are potentially subject to response biases and recall biases. In particular, cultural norms around admitting to the presence of social isolation can vary, which may have affected the finding that White males had higher odds of social isolation than individuals of other racial/ethnic backgrounds. Our resident sample was not nationally representative, as it included an overrepresentation of Asians and underrepresentation of Black and Hispanic residents—27.5% of residents were Asian, compared to less than 5% of subsidized housing residents reported nationally, while there were only 15.5% Black residents and 7.8% Hispanic residents, compared to about 33% and 13% of subsidized housing residents reported nationally, respectively (National Low Income Housing Coalition, 2012)—and given that a significant proportion of Asian-Americans come from immigrant backgrounds and face language barriers (Jang et al., 2022), these Asian residents' social connections could have been impeded by language/cultural differences, thereby confounding this study's findings. Likewise, the sample of housing sites was notable for an overrepresentation of some regions and underrepresentation of others—close to 40% of housing sites in the data set were in California, with about three-fifths of these having very low ADI values among the least disadvantaged 10% of all neighborhoods in the United States, while there were no housing sites located in the northeast or south-central United States. We also had incomplete social isolation responses and ADI data in our data sets, which led us to exclude 326 (8.5%) individual responses and 3 (3.2%) housing site responses from the area deprivation analysis. Additionally, data from two (2.1%) housing sites which were located close to one another had been merged into a single site in the data set before data analysis, and another three (3.2%) housing sites each only had a single LSNS-6 score reported, which could present potential sources of sampling error. Beyond missing data for individual residents and housing communities, the data set lacked specific data on households for privacy reasons, and thus we were not able to adjust for household factors that may have potentially served as confounding variables, such as household composition; however, given that nearly 90% of respondents lived alone, we believe that household composition was likely not a key driving factor for social isolation in our sample. Additionally, although we performed a large-scale cross-sectional analysis to investigate social isolation and possible risk factors in older adults living in subsidized housing communities, we did not examine loneliness as this data was not available, and the cross-sectional nature of this work limits inferences regarding causality. Finally, our analysis is limited in that we only incorporate ADI and do not incorporate other measures from the housing site environments which could have the potential to expand inferences from these highly diverse settings.

Our study adds to the literature on social isolation in older adults by underscoring the prevalence and correlates of social isolation in subsidized housing communities. Our findings suggest a need to investigate contextual and structural factors further to better understand the risk factors and patterns associated with social isolation among older subsidized housing residents. Although this study did not find a significant association between social isolation and area deprivation, other unidentified contextual factors may have affected residents' social connections and perceptions of their neighbors. This suggests potential methodological limitations associated with using the ADI in subsidized housing settings, as well as a need for more nuanced measures of neighborhood context, especially considering that there may be factors associated with subsidized housing communities that can differ from those in the surrounding neighborhoods. Thus, a potential direction for future research would be identifying subsidized housing sites with higher overall rates of social isolation among older adult residents and clarifying whether there are particular geospatial factors or housing site factors—such as housing site building design features, green space, local resources/amenities, and community violence/crime—which may be associated with residents' social isolation risk and perceptions of neighbors. From there, another critical area for future investigation would be examining how the interplay of individual and contextual factors can precipitate or protect against social isolation in this vulnerable population.

In the long term, these findings can aid housing organizations in more effectively screening and identifying older adults at risk for social isolation, and also inform the development of interventions aimed at targeting social isolation in older adults. Given that social isolation was associated with weaker perceived ties to neighbors in this study, a potential priority for future interventions would be increasing older adults' positive interactions with neighbors. This could be accomplished by promoting opportunities for social engagement through group activities, such as peer support groups, educational activities, volunteering, and health promotion activities (National Academies of Sciences, 2020). In doing so, such interventions could improve neighbors' perceptions and reduce social isolation. In addition, for future efforts to be effective, they must also account for "macro" factors beyond the individual at both the community and societal levels (Berkman et al., 2000; Umberson & Donnelly, 2023). Ultimately, further studies are needed to facilitate the design and evaluation of multilevel interventions/policies to help bolster social connections and improve health outcomes in low-income older adults. From there, future steps can then be taken by housing organizations to implement evidence-based interventions on a broader scale to address the burdensome problem of social isolation.

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Conflict of Interest

T. K. M. Cudjoe reported receiving consulting fees from Edenbridge Healthcare and Papa Inc outside the submitted work.

Data Availability

Of note, the data set used in this study is not publicly available given that the authors of this study have not yet completed planned or expected analyses for future publications. This study is not a clinical trial or systematic review, and therefore the pre-registration and data availability requirements are not applicable.

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