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Differences in Social Isolation and Its Relationship to Health by Rurality

Carrie Henning-Smith, PhD, MPH, MSW; Ira Moscovice, PhD; & Katy Kozhimannil, PhD, MPA

Rural Health Research CenterUniversity of Minnesota School of Public Health, Division of Health Policy and Management, Minneapolis, Minnesota

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For further information, contact: Carrie Henning-Smith, PhD, MPH, MSW, Division of Health Policy and Management, University of Minnesota School of Public Health, 2221 University Ave. SE, Suite 350, Minneapolis, MN 55414; e-mail: henn0329@umn.edu.

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Abstract

Purpose: Social isolation is an urgent threat to public health. Meanwhile, health outcomes across multiple measures are worse in rural areas, where distance to neighbors is often greater and opportunities for social interaction may be scarcer. Still, very little research examines rural-urban differences in social isolation. This study addresses that gap by examining differences in social isolation by rurality among US older adults.

Methods: Using Wave 2 of the National Social Life, Health, and Aging Project data (n = 2,439), we measured differences between urban and rural (micropolitan or noncore) residents across multiple dimensions of social isolation. We also conducted multivariable analysis to assess the associations between rurality, sociodemographic characteristics, and loneliness, overall and by rurality. Finally, we conducted multivariable analysis to assess the association between social isolation and self-rated health, adjusting for rurality.

Findings: Compared to urban residents, rural residents had more social relationships and micropolitan rural residents were more likely to be able to rely on family members (95.8% vs 91.3%, $P < .05$). Micropolitan rural residents reported lower rates of loneliness than urban residents after adjusting for sociodemographic and health characteristics ($b = -0.32$, $P < .05$), whereas noncore rural, non-Hispanic black residents had a greater likelihood of reporting loneliness ($b = 4.33$, $P < .001$).

Conclusions: Overall, noncore and micropolitan rural residents reported less social isolation and more social relationships than urban residents. However, there were differences by race and ethnicity among rural residents in perceived loneliness. Policies and programs to address social isolation should be tailored by geography and should account for within-rural differences in risk factors.

Key words loneliness, older adults, social determinants of health, social isolation, social support.

Social isolation, defined as a lack of contact with friends, family members, neighbors, and society at large, is on the rise and poses significant risk for poor health outcomes, including mortality.[1,2] Social isolation has been linked with a variety of poor health outcomes, including increased blood pressure and stress levels, diminished immune system functioning, substance use, depression, suicide, and increased risk of Alzheimer's disease and poorer cognitive functioning.[3,4] Meanwhile, having strong social support is linked to better health outcomes, including greater rates of physical activity among rural older adults.[5,6] Social isolation is prevalent among US adults age 65 and older. As many as 43% of all community-dwelling older adults report being socially isolated,[7] and a recent report estimated that the cost of social isolation to the Medicare program alone is nearly $7 billion annually.[8] Social isolation is related to, and often inclusive of, the concepts of loneliness, social

relationships, social support, and social capital.[9,10] In this study, we use a broad definition of social isolation that encompasses all of these.

The issue of social isolation has garnered increasing attention from the media, researchers, and policymakers alike, including an April 27, 2017, US Senate Special Committee on Aging hearing on social isolation, led by Senators Collins (R-ME) and Casey (D-PA).[11] In the hearing, senators and expert witnesses testified about the importance of focusing on and addressing social isolation; this study is responsive to that call, with a specific focus on differences by rurality. Rural areas have demonstratively poorer health outcomes and health behaviors than urban areas.[12,13] However, the mechanisms for those differences are not entirely understood. On one hand, rural areas are, on average, older and poorer than their urban counterparts.[14,15] They also face unique constraints related to accessing health care, including mental health care.[16,17] Rural areas also face unique challenges related to social isolation, including challenges related to transportation, access to broadband Internet, and other practical constraints on fostering relationships between people who live more remotely.[18-21] Still, there is limited research on rural-urban differences in social isolation and what does exist provides an unclear picture. For example, rural residents appear to be more likely to know their neighbors, but no less likely to feel lonely than their urban peers.[22] Some studies have found that rural residents are less socially active and have poorer social support than their urban counterparts.[23,24] There is also evidence from outside the United States that older rural women are more likely to experience cognitive impairment than older urban men,[20] indicating differences in risk by both location and gender.[25] It is crucial to understand how various aspects of social isolation vary by geography in order to inform targeted policy and programmatic interventions, such as screening for loneliness in clinical encounters, supporting community facilities and events designed to increase connectivity, and developing programs designed to reach older adults who cannot easily leave their homes.

This study examined differences by rurality in social isolation (comprising social relationships, loneliness, and social participation) among older adults and their spouses/partners in the United States. Using national survey data, we (1) assessed differences by rurality (urban vs rural micropolitan and rural noncore) in measures of social isolation; (2) measured how social relationships and social participation are associated with perceived loneliness, including variation by rurality; and (3) determined how social isolation is independently associated with health, above and beyond rurality and sociodemographic characteristics. Given higher rates of morbidity and mortality in rural areas, combined with older population structures and more disparate population centers,[12,26] we hypothesized that social isolation may be more prevalent in rural areas than in urban settings. Further, we hypothesized that the magnitude of the relationship between sociodemographic risk factors and social isolation may be stronger in rural settings, where the overall risk for social isolation may be greater because of lower population density.

Methods

Data and Sample

Data for this study come from Wave 2 (2010-2011) of the National Social Life, Health, and Aging Project (NSHAP), a nationally representative survey of older adults and their co-resident spouses/partners. The NSHAP was designed to collect data on older adults' social lives, health, relationships, and sociodemographic characteristics. Wave 2 included 3,377 residents born between 1920 and 1947, comprised the original sample from Wave 1 (ages 57-85 in 2005-2006), regardless of whether they participated in Wave 1, along with any spouses and co-resident partners. Interviews were conducted in residents' homes and the overall response rate for Wave 2 was 75%. More information on the NHSAP sample and data collection has been published elsewhere.[27] The NSHAP data contain some of the most comprehensive information on indicators of social isolation and social well-being, including perceived isolation and loneliness, family and friend relationships, physical disconnectedness from others, lack of social support, and participation in social activities. We accessed restricted data through a secure data enclave in order to identify the county of the respondent for the purposes of assessing rurality. For this study, we used all residents with complete information on all analytic variables, resulting in a final sample size of 2,439. The majority of missing variables (72%) were for the 3 loneliness scale items, which were included in a respondent-administered questionnaire that was left with the respondent after the interview, to be mailed back in a preaddressed, postage-paid envelope. There were no differences by rurality in missingness among items on the loneliness scale.

Measurement

Social isolation is multifaceted.[9] To reflect this, we included measures of social isolation across multiple dimensions. Perceived social support was measured by whether the respondent felt that they could open up

to and rely on family members and friends (some of the time/often vs never, hardly ever, rarely). Social relationships were measured by marital status (has a current partner/spouse vs not), number of close relatives (relatives that the respondent feels "close" to), number of friends, number of living children, and number of grandchildren. Loneliness was measured using 3 items: how often the respondent felt "left out," isolated, or lacked companionship. All 3 items had a range of 0 (rarely/none of the time) to 3 (most of the time). We combined these into a 3-item loneliness scale, following prior research using these variables,[28] with a range of 0-9; 9 indicated the highest level of loneliness. Finally, we included measures of social participation, including how often the respondent attended a meeting of an organized group (examples provided to residents included "a choir, a committee or board, a support group, a sports or exercise group, a hobby group, or a professional society"),[27] attended church or another place of worship, or socialized with others. Response options for all 3 measures included less than once a year, once a year to several times a year, monthly, or weekly or more.

The key independent variable for our analysis was rurality, which we assessed using Rural-Urban Commuting Area (RUCA) codes, available through a restricted data enclave. RUCA codes assign values of 1-10 to counties, based on population size and commuting patterns. We collapsed these into 3 categories: urban (metropolitan; RUCA codes 1-3), micropolitan rural (RUCA codes 4-6, including rural counties with population centers of up to 49,999 and/or significant commuting to a metropolitan area), and noncore rural (RUCA codes 7-10, including rural counties with population centers <10,000 and/or limited commuting to metropolitan and micropolitan counties.)[29]

We also included several sociodemographic characteristics in our analyses, including gender, age, race, and ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other), nativity (born in the United States vs outside of the United States), educational attainment (<high school degree, high school degree, some college, college degree, or more), household income (measured as <$50,000 vs $50,000 or more), and employment status (currently employed full or part-time vs unemployed/not in the labor force). Additionally, given the important relationships between health status and social participation,[30-32] we included 2 measures of health: self-rated physical health (good/very good/excellent vs fair/poor) and hearing loss that limited social activities. We included hearing loss because it is significantly associated with higher risk of social isolation.[33]

Analyses

In order to detect differences by rurality in sociodemographic characteristics and social isolation and well-being, we conducted bivariate comparisons, using chi-squared tests for categorical variables and t-tests for continuous variables. In both cases, we compared micropolitan and noncore rural residents with urban residents in order to detect significant differences between rural and urban populations. Next, we conducted ordinary least squares (OLS) regression analyses predicting the 3-item loneliness scale, adjusting for other measures of social isolation, rurality, and sociodemographic characteristics. We first ran the model with the full sample, then with interaction terms between rurality and the social isolation variables. We found several significant interaction effects, so we then ran models stratified by rurality to detect differences in associations by location. Finally, we conducted ordered logistic regression analyses predicting self-rated health (1 = poor, 5 = excellent), adjusting for rurality, social isolation, and sociodemographic characteristics. For the 3-item loneliness scale, we also conducted sensitivity analyses using ordered logistic regression analyses and found that the significant associations were consistent across the analyses. We present the OLS results here for ease of interpretation. All analyses were weighted to generate nationally representative estimates and to account for the complex survey design.

Results

The average age of the sample population was approximately 71 years and the majority (just over 50%) of residents were female, across all levels of rurality (Table 1). Micropolitan and noncore rural residents were more likely than urban residents to be non-Hispanic white (92.4% and 91.5% vs 82.3%, respectively, $P < .05$). Micropolitan and noncore rural residents were also more likely to have been born in the United States than urban residents (97.0% and 99.2% vs 90.7%, $P < .001$). Micropolitan rural residents were significantly less likely to be employed, compared to urban residents (18.0% vs 27.5%, $P < .001$), and noncore rural residents were more likely than urban residents to have hearing problems that limit their social activities (17.0% vs 10.5%, $P < .05$). In this population, there were no significant differences by geography in educational attainment or household income.

Table 2 shows differences by rurality in measures of social relationships, loneliness, and isolation. Micropolitan rural residents were more likely than urban residents

Table 1 Sample Characteristics by Rurality

	Urban	Micropolitan Rural	Noncore Rural	Micro vs Urban	Noncore vs Urban
				P value	*P* value
Female	55.5%	55.2%	52.5%	.85	.39
Age, y, mean (range 38-99; SD 7.8)	70.9	71.0	71.6	.63	.52
Race and ethnicity				.03	.05
Non-Hispanic white	82.3%	92.4%	91.5%		
Non-Hispanic black	7.5%	4.8%	0.5%		
Hispanic	7.8%	1.5%	3.0%		
Other	2.4%	1.2%	5.1%		
Born in the United States	90.7%	97.0%	99.2%	<.001	<.001
Educational attainment				.52	.18
Less than high school	12.6%	15.3%	9.4%		
High school degree	23.3%	26.2%	31.8%		
Some college	34.4%	33.0%	39.2%		
College degree	29.7%	25.6%	19.7%		
Household income of $50K or above	62.5%	63.0%	60.6%	.92	.74
Currently employed	27.5%	18.0%	32.5%	<.001	.24
Good, very good, or excellent self-rated health	78.4%	76.4%	82.7%	.54	.31
Hearing limits social activities	10.5%	10.6%	17.0%	.95	.01
Sample size = 2,439	1,934	342	163		

to report that they can rely on family members (95.8% vs 91.3%, $P < .05$). Noncore rural residents had significantly more relatives who they felt close to than urban residents, with 16.6% of all noncore rural residents reporting that they had more than 20 close relatives, compared with 6.7% of urban residents ($P < .001$). Similarly, noncore rural residents had more living children (mean 3.6 vs 2.8, $P < .001$) and grandchildren (7.2 vs 5.3, $P < .01$) than urban residents. And, both micropolitan and noncore rural residents had more friends, on average, than urban residents, with 31.9% of micropolitan and 33.7% of noncore rural residents reporting that they had more than 20 friends, compared with 21.3% of urban residents ($P < .05$ and $P < .01$, respectively). Notably, however, nearly 5% of micropolitan rural residents reported having no friends, compared with 1.8% of urban residents and 0.7% of noncore rural residents.

Micropolitan rural residents were less likely than urban residents to report lacking companionship (31.1% vs 36.9%, $P < .05$), but noncore rural residents were more likely than urban residents to report feeling left out (38.1% vs 29.7%, $P < .05$). There were no differences by rurality in other measures of social support, partnership status, feeling isolated, and in social participation. Nearly half of residents across all locations attended a place of worship at least weekly and more than half socialized with others weekly or more. Still, 22.9% of urban residents, 25.8% of micropolitan rural residents, and 17.7% of noncore rural residents reported that they socialized with others less than once a month.

In adjusted models predicting loneliness (Table 3), living in a rural, micropolitan county was associated with less loneliness ($b = -0.32$, $P < .05$). Being married/partnered, Hispanic, having better physical health, being able to rely on family members, and having more close friends were all also associated with lower levels of loneliness, whereas having more education and having hearing problems were both associated with more loneliness. In stratified models by rurality, those same associations held for urban residents. In addition, attending more social events was associated with less loneliness for urban residents ($b = -0.21$, $P < .01$). For micropolitan rural residents, being in the "other" race and ethnicity category (including Asian and multiple races) was associated with less loneliness ($b = -1.8$, $P < .01$) and being employed was associated with greater loneliness ($b = 0.75$, $P < .05$). For noncore rural residents, being non-Hispanic black was associated with much higher levels of loneliness ($b = 4.33$, $P < .001$), with the largest coefficient of any of the models. Being able to rely on friends and having more children were both associated with less loneliness for noncore rural residents, while attending more social events was actually associated with greater feelings of loneliness ($b = 0.50$, $P < .01$).

Table 4 shows the association between rurality and social support, relationships, and isolation with health,

Table 2 Social Support, Loneliness, and Social Isolation by Rurality

	Urban	Micropolitan Rural	Noncore Rural	Micro vs Urban	Noncore vs Urban
				P value	*P* value
Social support					
Respondent can open up to family	84.9%	85.3%	85.2%	.88	.89
Respondent can rely on family	91.3%	95.8%	92.8%	.048	.62
Respondent can open up to friends	72.6%	68.8%	75.8%	.21	.47
Respondent can rely on friends	82.5%	84.7%	90.9%	.35	.05
Number of close relatives				.89	<.001
None	1.7%	2.0%	1.1%		
1	5.1%	5.1%	2.7%		
2-3	24.9%	25.9%	17.3%		
4-9	45.5%	41.8%	38.8%		
10-20	16.2%	16.9%	23.6%		
More than 20	6.7%	8.4%	16.6%		
Number of living children, mean	2.75	2.57	3.56	.40	<.001
Number of grandchildren, mean	5.28	4.79	7.23	.44	.00
Number of friends				.02	.00
None	1.8%	4.5%	0.7%		
1	3.1%	1.9%	0.6%		
2-3	15.0%	14.6%	8.8%		
4-9	31.6%	27.6%	33.3%		
10-20	27.2%	19.5%	23.0%		
More than 20	21.3%	31.9%	33.7%		
Has a current partner or spouse	71.3%	67.8%	70.1%	.20	.86
Loneliness scale, mean (range 0-9)	3.1	2.83	3.33	.08	.65
Lack companionship often/some of the time	36.9%	31.1%	38.2%	.04	.76
Feel left out often/some of the time	29.7%	26.9%	38.1%	.48	.046
Feel isolated often/some of the time	26.5%	23.8%	29.2%	.45	.49
Attends group meetings				.17	.32
<Once a year	36.0%	41.1%	35.6%		
Once a year to several times a year	17.3%	14.9%	20.7%		
Monthly	19.3%	14.4%	22.6%		
Weekly or more	27.4%	29.5%	21.2%		
Attends a church or place of worship				.92	.45
<Once a year	23.3%	21.5%	21.4%		
Once a year to several times a year	22.5%	22.1%	17.6%		
Monthly	7.9%	8.2%	11.6%		
Weekly or more	46.4%	48.2%	49.4%		
Socializes with others				.24	.46
<Once a year	2.3%	1.8%	1.7%		
Once a year to several times a year	20.7%	24.0%	16.0%		
Monthly	23.2%	18.4%	22.5%		
Weekly or more	53.9%	55.8%	59.8%		
Sample size = 2,439	1,934	342	163		

adjusting for other demographic characteristics. There were no significant differences by rurality in self-rated health. Among the variables looking at social support, relationships, and isolation, higher perceived loneliness was associated with poorer health (adjusted odds ratio [AOR]: 0.89, $P < .001$), and attending group meetings more regularly was associated with better health (AOR: 1.10, $P < .001$). Being non-Hispanic black was associated with poorer health (AOR: 0.65, $P < .01$), and having more education and being employed were both associated with better self-rated health.

Discussion

In this study, we investigated differences in multiple dimensions of social isolation by rurality. Contrary to our

Table 3 Adjusted Association between Rurality and 3-Item Loneliness Scale

	Full Sample		Urban Only		Micropolitan Rural Only		Noncore Rural Only	
	Coef.	95% Confidence interval	Coef.	95% Confidence interval	Coef.	95% Confidence interval	Coef.	95% Confidence interval
Rurality (Ref: Metropolitan)								
Micropolitan	−0.31*	(−0.60, −0.03)						
Noncore	0.23	(−0.22, 0.69)						
Female	0.07	(−0.19, 0.33)	−0.06	(−0.37, 0.24)	0.43	(−0.03, 0.90)	0.89	(−0.01, 1.79)
Age	−0.01	(−0.02, 0.01)	−0.01	(−0.03, 0.00)	−0.01	(−0.05, 0.03)	0.02	(−0.03, 0.06)
Married or partnered	−1.18***	(−1.47, −0.89)	−1.20***	(−1.52, −0.88)	−0.97*	(−1.90, −0.05)	−1.58**	(−2.39, −0.76)
Race and ethnicity (Ref: non-Hispanic white)								
Non-Hispanic black	−0.09	(−0.43, 0.26)	−0.07	(−0.44, 0.31)	−0.44	(−1.03, 0.15)	4.33***	(2.95, 5.70)
Hispanic	−0.53*	(−1.04, −0.02)	−0.53	(−1.08, 0.03)	−0.36	(−1.34, −0.62)	−0.71	(−1.60, 0.18)
Other	−0.31	(−1.02, 0.40)	−0.09	(−0.89, 0.70)	−1.80**	(−2.92, 0.68)	−0.50	(−1.59, 0.59)
Born in the United States	0.31	(−0.12, 0.74)	0.24	(−0.21, 0.70)	0.27	(−0.41, 0.94)	2.34	(−0.53, 5.22)
Educational attainment (Ref: <HS)								
High school degree	0.27	(−0.04, 0.59)	0.27	(−0.07, 0.62)	0.17	(−0.42, 0.76)	0.23	(−1.32, 1.77)
Some college	0.40**	(0.13, 0.67)	0.44**	(0.13, 0.75)	0.23	(−0.31, 0.78)	0.39	(−0.91, 1.69)
College degree	0.58***	(0.28, 0.88)	0.58**	(0.25, 0.92)	0.47	(−0.31, 1.24)	0.68	(−0.67, 2.02)
Household income of $50K or above	−0.02	(−0.25, 0.20)	−0.09	(−0.33, 0.16)	0.00	(−0.54, 0.53)	0.64	(−0.28, 1.55)
Currently employed	0.00	(−0.25, 0.24)	−0.18	(−0.47, 0.12)	0.75*	(0.06, 1.44)	0.03	(−0.85, 0.90)
Physical health	−0.26***	(−0.39, −0.14)	−0.29***	(−0.42, −0.14)	−0.14	(−0.39, −0.12)	−0.14	(−0.57, 0.29)
Can rely on family	−0.40*	(−0.75, −0.04)	−0.53**	(−0.92, −0.15)	0.47	(−0.84, −1.79)	−0.09	(−2.14, 1.95)
Can rely on friends	−0.26	(−0.55, 0.03)	−0.18	(−0.52, 0.16)	−0.32	(−0.97, 0.34)	−1.62*	(−3.01, −0.23)
Number of close relatives	−0.04	(−0.21, 0.14)	0.02	(−0.15, 0.19)	−0.27	(−0.66, 0.12)	0.20	(−0.35, 0.75)
Number of close friends	−0.23***	(−0.33, −0.13)	−0.19**	(−0.30, −0.08)	−0.27	(−0.56, −0.03)	−0.37	(−0.75, 0.01)
Number of children	0.03	(−0.04, 0.10)	−0.01	(−0.10, 0.07)	0.19	(−0.04, 0.41)	0.16	(−0.02, 0.34)
Number of grandchildren	0.00	(−0.02, 0.03)	0.00	(−0.03, 0.03)	0.03	(−0.04, 0.11)	−0.06*	(−0.10, −0.01)
Frequency of attending group meetings	0.00	(−0.11, 0.11)	0.03	(−0.09, 0.16)	−0.01	(−0.30, 0.28)	−0.30	(−0.65, 0.05)
Frequency of church attendance	0.01	(−0.10, 0.13)	0.02	(−0.11, 0.14)	−0.08	(−0.42, 0.26)	0.08	(−0.31, 0.46)
Frequency of social events	−0.16	(−0.33, 0.02)	−0.21**	(−0.35, −0.06)	−0.22	(−0.74, 0.30)	0.50**	(0.23, 0.78)
Hearing limits social activities	0.82***	(0.48, 1.15)	0.76**	(0.34, 1.18)	0.77	(−0.07, 1.60)	1.71***	(1.28, 2.15)
Intercept	6.31		6.84		5.30		0.96	
N	2,433		1,928		342		163	
R^2	0.132		0.133		0.196		0.318	

Note: Results are generated from ordinary least squares regression models. Column 1 presents the full sample; the remaining 3 columns are stratified by rurality.
Results are significant at $^{*}P < .05$, $^{**}P < .01$, and $^{***}P < .001$.

hypothesis, we found that where there were differences in social isolation, they tended to be worse for urban residents, at least in unadjusted models. For example, micropolitan rural residents were more likely than urban residents to say that they could rely on their family and they were less likely to report feeling that they lacked companionship. Noncore rural residents reported having more relatives they felt close to, more living children, more grandchildren, and more friends than urban residents. Yet, interestingly, micropolitan rural residents were more likely than urban residents to report having no friends (4.5% vs 1.8%) as well as to report having more than 20 friends (31.9% vs 21.3%). The only measure on which noncore rural residents fared worse than urban residents was feeling left out; they were more than 10 percentage points more likely to report feeling left out often or at least some of the time.

In many ways, these findings counter the conventional narrative of rural areas being disadvantaged along markers of health and determinants of health, relative to urban areas.[13,34] Rather than painting a bleak picture, our findings show that older adults and their spouses/partners in rural areas have larger and stronger social networks than their urban peers. Specifically, on average, rural residents had more social relationships (both friends and family) and were more likely to say that they could rely

Table 4 Adjusted Odds Ratio of Self-Rated Health

	Adjusted Odds Ratio	95% Confidence Interval
Rurality (Ref: Metropolitan)		
Micropolitan	0.97	(0.71, 1.31)
Noncore	0.93	(0.69, 1.27)
Female	1.15	(0.94, 1.42)
Age	1.01	(1.00, 1.03)
Married or partnered	0.98	(0.79, 1.21)
Race and ethnicity (Ref: non-Hispanic white)		
Non-Hispanic black	0.65**	(0.48, 0.89)
Hispanic	0.74	(0.47, 1.15)
Other	0.76	(0.43, 1.36)
Born in the United States	0.92	(0.69, 1.23)
Educational attainment (Ref: <HS)		
High school degree	1.67**	(1.19, 2.36)
Some college	1.92**	(1.24, 2.97)
College degree	3.01***	(1.75, 5.18)
Household income of $50K or above	1.28	(0.98, 1.68)
Currently employed	1.94***	(1.44, 2.60)
Loneliness scale	0.89***	(0.85, 0.93)
Can rely on family	1.22	(0.83, 1.78)
Can rely on friends	1.16	(0.95, 1.41)
Number of close relatives	1.00	(0.90, 1.12)
Number of close friends	1.04	(0.95, 1.14)
Number of children	0.97	(0.88, 1.07)
Number of grandchildren	0.98	(0.96, 1.01)
Frequency of attending group meetings	1.10**	(1.03, 1.17)
Frequency of church attendance	1.01	(0.95, 1.07)
Frequency of social events	1.07	(0.97, 1.18)
N		2,433

Notes: Results are generated from ordered logistic regression models predicting self-rated health (1 = poor; 5 = excellent).
Results are significant at $^{*}P < .05$, $^{**}P < .01$, and $^{***}P < .001$.

on those contacts. As rural areas continue to change, demographically and economically, policies and programs should seek to capitalize on the potential strengths embedded in rural social ties, which may help buffer rural residents from the negative health consequences of social isolation.

Still, our findings were not universally positive for rural residents and their nuances should not be overlooked. In particular, the finding that nearly 5% of micropolitan rural residents report having no friends at all is startling and should raise concern about the quality of life and well-being of those individuals. Programs designed to facilitate social relationships and foster friendship between older adults (and intergenerationally) may be especially needed in micropolitan counties, and efforts should be made to target those individuals who are currently most isolated. There are a variety of ways in which this could be done, including through screening for loneliness and isolation in clinical encounters, home visiting programs, community programming, and facilitating ways for isolated older adults to share their talents through volunteering and mentoring programs as appropriate.

Further, while noncore rural older adults had more social relationships than metropolitan older adults, they fared no better in terms of perceived loneliness in both unadjusted and adjusted analyses. Micropolitan older adults, on the other hand, reported lower levels of loneliness—shown in Table 2—and those were consistent after adjusting for sociodemographic characteristics and objective measures of isolation. This finding, that noncore rural older adults have more relationships, but have rates of loneliness as high as their metropolitan counterparts, warrants additional attention. Noncore rural residents may face unique barriers to connecting with others, including limited access to transportation and broadband connectivity.[19]

Additionally, the multivariable models revealed that non-Hispanic black residents in noncore rural counties had significantly higher rates of perceived loneliness than non-Hispanic white residents (equal to an increase of more than 4 points on the 9-point loneliness scale.) The same was not true for non-Hispanic black residents in urban or micropolitan rural counties. This finding should raise concern about the well-being and social integration of black residents in the most rural counties. This finding aligns with other research showing racial and ethnic disparities in health and health care among rural residents, with particular disadvantages for rural non-Hispanic black residents.[35-38] Future research should seek to better understand this finding, including whether it varies by state or region and to identify effective solutions to address it.

These findings should also provide motivation for addressing social isolation among urban residents. Given the findings that urban residents have smaller social networks (both friends and relatives), more attention could be paid to how to facilitate connections between older adults in urban areas, as well as facilitating connections across generations. To do this well, older adults could be asked to share their skills and expertise though volunteering or other programs that will offer a sense of meaning.[39,40] In multivariate models, we found that urban residents with higher education were at greater likelihood for feeling lonely; perhaps finding ways for those individuals to share their specific talents and expertise could help to alleviate the risk of loneliness and its potential negative health impacts.

Implications

Given the widespread impact of social isolation on health,[8,41-43] public health interventions are urgently needed at the federal, state, and local levels to decrease isolation and mediate its impacts on health outcomes. Such strategies might include telephone and in-person visiting programs, screenings and assessments for isolation, activities to foster community connectedness, transportation, mobile technology, and public health awareness campaigns. At the federal level, this might include devoting resources toward programs like the Older Americans Act, which supports a broad range of programs that can provide social and instrumental support to older adults, such as home-delivered meals and transportation. At the state level, using resources to bolster call lines for referrals and assistance and innovating around transportation and Medicaid payment models, especially for isolated older adults needing home and community-based services may help. At the local level, community-based initiatives to increase social connections may help. Our finding that the majority of older adults and their spouses/partners attend a place of worship at least once a month might be a entry point for such activities, although initiatives should also be designed to include those who would prefer to engage with others outside of a faith-based setting. Other settings for community-based programming may include senior centers, civic centers, museums,[44] and other public spaces, although the availability of those varies by rurality.[45] Ultimately, a multifaceted and comprehensive approach is necessary for addressing social isolation across all levels of geography.[46]

More research is needed to assess the evidence base for interventions to address social isolation[47]; however, our findings underscore the importance of acting on this issue. Our findings also suggest that interventions should be tailored by geographic setting, where demographic, economic, and health care characteristics differ as well. This study provides policy-relevant information by identifying differences in the prevalence of and risk factors for social isolation by rural-urban location, which are relevant for identifying potential policy and programmatic interventions.

Limitations

Despite its novel findings, this study should be considered in light of its limitations. This analysis relies on cross-sectional data, which cannot illuminate causality between measures. Still, the fact that we found differences by rurality signals that social isolation operates differently by geographic context. Further, while we were able to identify racial and ethnic differences in social isolation among different levels of rurality, the sample sizes for various subpopulations were relatively small. More targeted research should be done to better understand variations in the experience of social isolation, especially among rural residents of different racial and ethnic backgrounds. Additionally, this analysis focused on older adults, and findings may not generalize to younger people. Social isolation affects more than 40% of United States older adults, but it can be problematic at all ages. More research is needed to understand the prevalence of and risk factors for social isolation among younger people in rural areas, as well as to inform effective intervention strategies to increase social connection. Mortality rates are rising among subgroups within the rural population, including middle-aged men and women, and stark rural-urban disparities in mortality and morbidity lay bare the need for policy solutions to reduce "deaths of despair." It is imperative that research and policy address upstream causes of disproportionate rural mortality.

Conclusion

Both noncore and micropolitan rural residents reported larger and stronger social networks and more social relationships than urban residents. However, noncore rural residents reported similar levels of perceived loneliness to those living in metropolitan areas. Additionally, noncore rural, non-Hispanic black residents had a significantly greater likelihood of scoring poorly on the loneliness scale, indicating troubling racial disparities in rural loneliness and potential areas in which to intervene to reduce isolation and its negative health consequences. As social isolation and loneliness increasingly gain recognition as urgent population health issues, there is a critical need for targeted information on the prevalence and risk factors for being isolated and lonely by geography in order to design targeted, effective interventions. This study finds that while rural residents report less isolation and more social relationships, there are within-rural disparities in the likelihood of loneliness that should be addressed by targeted policy and public health interventions.

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