Brief Report

Assessing factors associated with social connectedness in adults with mobility disabilities

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ABSTRACT

Background: People with mobility disabilities are likely to report limitations in community participation and social connectedness for a variety of reasons, including inaccessible physical environments, health issues, transportation barriers, and limited financial resources. Improving social connectedness is a public health issue and research shows its relation to overall health and life expectancy.
Objective: The purpose of this study was to (1) assess social activity, isolation, and loneliness among people with mobility disabilities compared to those with non-mobility disabilities and (2) understand factors associated with social connectedness among people with mobility disabilities.
Methods: An observational, cross-sectional analysis was conducted using data from Wave 2 of the National Survey on Health and Disability (NSHD) to test for differences between adults age 18–64 with mobility disabilities ($n = 621$) and those with other disabilities ($n = 1535$), in addition to tests within the mobility disability group.
Results: Adults with mobility disabilities were less likely than respondents from other disability groups to report feeling isolated (30.2% versus 35.2%), but these groups did not differ on measures of social activity or loneliness. Within the mobility disability group, being unemployed and in fair or poor health were predictive of greater loneliness, more isolation, and less satisfaction with social activity.
Conclusions: Social connectedness is an important public health issue. This research helps to inform service providers and medical professionals about the personal factors affecting social connectedness among people with mobility disabilities.
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Community participation among people with disabilities is necessarily a subjective concept, with different individuals valuing different experiences.[1] Nevertheless, using data from focus groups of people with various disabilities, Hammel et al.[2] concluded that participation was broadly viewed as a means to experience social connectedness with other people and communities. Social connectedness, in turn, has been shown to have a direct relationship with mental and physical health and even mortality rates, such that better social connections are associated with better health and longer lives.[3–5] Indeed, Holt-Lundstad[6] frames improving social connectedness as a public health issue as important as addressing obesity, physical inactivity, and air pollution.

Social connectedness can be measured through several constructs, including levels of social isolation, satisfaction with social activities, and perceptions of loneliness.[4] Research has shown that two of these constructs, social isolation and loneliness, are often not significantly correlated.[7] For instance, a person who is socially isolated may be content with their level of social activity, and a person who has frequent social activity may still feel lonely. Previous research on these constructs has focused on older adults,[7,8] identifying multiple factors that can affect social connectedness in this population. Our prior research has shown differences in various social connectedness measures by disability type. For example, people with intellectual disability/autism were more

likely to report feeling socially isolated,[9] while people with psychiatric disabilities were more likely to report dissatisfaction with their level of social activity.[10] Repke & Ipsen[11] found that geography played a role in perceptions of connectedness among people with disabilities, with those living in urban areas more likely to report feeling socially isolated. They also found that, in rural areas, employment was associated with more positive feelings of participation and decreased social isolation.

For people specifically with mobility disabilities, research has found that social connectedness can be disrupted by multiple factors. A systematic review by Barclay et al.[12] found that lack of transportation was a barrier to participation for people with spinal cord injuries. In an additional study, obstacles to participation for people with mobility disabilities identified by Barclay et al.[13] included health issues and lack of financial resources. More broadly, people with mobility disabilities are at increased risk of experiencing physical environments that are not accessible to them. They may be less likely to visit other people because homes are often not accessible,[14] or they may not frequent community activities that are hosted in inaccessible locations.[15]

In this study, we used national survey data to compare the social connectedness of people with physical/mobility disabilities to that of people with other disabilities. We then explored specific factors influencing satisfaction with level of social activity, feelings of isolation, and measures of loneliness among survey respondents with mobility disabilities. Findings can inform our understanding of social connectedness for people with mobility disabilities and interventions and policies to support increased connectedness for this group.

Methods

Data source

This study uses data from the second wave of the National Survey on Health and Disability (NSHD) fielded October 2019 through January 2020. The NSHD is a national, longitudinal online survey of working-age adults with all types of disabilities.[10] Recruitment for the NSHD included distribution by national disability and condition-specific organizations (e.g., National Alliance on Mental Illness, National Council on Independent Living, The Arc, MS Society and over 70 others) and national conferences. Further recruitment was conducted using Amazon Mechanical Turk (MTurk) in order to obtain respondents who did not have connections to the national organizations assisting with recruitment and were more diverse in terms of race, rurality, and disability type.[16] In order for the sample to be most representative of the disability population, unweighted tabulations of sociodemographic characteristics from the 2019/2020 NSHD sample of 2175 respondents were compared to weighted estimates from the 163,689 adults ages 18 to 64 with at least one disability and internet access at home in the 2018 American Community Survey (ACS). We then used the ipfweight program in STATA (v15) to perform iterative proportional fitting based on demographic areas that were under- or over-represented in the NSHD sample, including age, gender, race, ethnicity, educational attainment, and metropolitan status.

Measures

While consisting of 13 unique domains overall, the NSHD domains of interest for the analyses presented here included community participation/connectedness, health status, employment, personal assistance services (PAS), and demographics, including disability.

Community Participation/Social Connectedness. While the NSHD was not specifically designed to assess connectedness, several measures were included as they are relevant to health and can vary greatly between and among people with different disability types. Satisfaction with level of social activity, perceived social isolation, and loneliness measures used in this study were 5 items included in the NSHD Community Participation domain. Two items were from NIH's Patient-Reported Outcomes Measurement Information System (PROMIS) question bank,[17] including:

1) "I am satisfied with my current level of social activity," Likert-like scale ranging from 1 = *not at all* to 5 = *very much* (PROMIS, Social Activities v1.0) and
2) "I feel that I am isolated from other people and my community," Likert-like scale ranging from 1 = *not at all* to 5 = *very much* (adapted from PROMIS, Social Isolation v2.0)

For these two items, dichotomous variables were created. The response option of 1 = *not at all* satisfied with level of social activity was compared to the 4 other response categories, while the response option of 5 = *very much* isolated was compared to the 4 other response categories. Response options to the three items of the Loneliness Scale[18] are: 1 = *hardly ever*, 2 = *sometimes,* and 3 = *often*. These items are totaled to provide an overall loneliness score ranging from 3 to 9, with greater total scores indicating higher levels of loneliness. The Loneliness Scale items include:

1) "How often do you feel you lack companionship?";
2) "How often do you feel left out?"; and
3) "How often do you feel isolated from others?"

Health Status. Self-reported health status was measured using one item: "In general, would you say your health is …" (1 = *poor*, 2 = *fair*, 3 = *good*, 4 = *very good*, 5 = *excellent*).

Employment. Respondents to the NSHD were asked if they were employed for pay, self-employed, or not working for pay. For this study, the employed group consisted of those who reported being employed for pay or self-employed.

Personal Assistance Services (PAS). The PAS domain of the NSHD included items regarding receiving both paid and unpaid PAS from various sources in addition to days and hours per day of each. For these analyses, data from the following PAS item was used: "Because of a health condition or disability, do you currently receive help in your home with personal care or daily activities?" Respondents could indicate paid and/or unpaid support received and who provided the services with a final option indicating "I need this type of assistance but do not get it."

Demographics. Standard demographic items for gender, age, race/ethnicity, household income, education level, marital status, and parental status were included in the NSHD. The disability item used for these analyses was: "Which ONE category would you use to describe your main disability or health condition?" Respondents selected a category from the following randomized list as their main/primary disability: intellectual/cognitive, mental illness/psychiatric, chronic illness or disease, physical/mobility disability, sensory, developmental, or neurological. Those who responded physical/mobility disability were one group with all other respondents grouped together for comparative analyses.

Data analysis

Using chi-square and ANOVA, calculations were conducted to test for differences between the physical/mobility disability group (n = 621) and those with other disabilities (n = 1535) on all measures (see Table 1). Next, we conducted similar tests within the physical/mobility disability group to determine which

demographic factors were associated with levels of social activity, social isolation and loneliness (see Table 2). We then conducted binary logistic regression to determine odds ratios related to social isolation and satisfaction with social activity and linear regression to see which factors were predictive of greater levels loneliness. SPSS V. 27 was used to conduct all analyses.

Results

Compared to other respondents, those with physical/mobility disabilities were more likely to be older, white, unemployed, and reside in rural communities (Table 1). They were also more likely to smoke, but there were no significant differences between groups in regard to reporting fair or poor health status. Overall, they were less likely than respondents from other disability groups to report feeling isolated from others and the community and had no differences on measures of social activity or loneliness. They also did not significantly differ from other respondents on other demographics such as marital status, parental status, or education level.

Chi-square and ANOVA results within the physical/mobility disability group (Table 2) showed that respondents with certain demographic characteristics were significantly more likely to report greater levels of isolation, loneliness, and dissatisfaction with level of social activity, including people who reported being unemployed ($p < .001$), non-white ($p < .05$), having lower income ($p < .01$), and reporting fair or poor health ($p < .001$). In addition, younger respondents reported significantly higher levels of loneliness ($p < .01$). Males reported greater social isolation than females (17.4% v. 12.5%), while females were more likely to report less satisfaction with their social activities than males (26.4% v. 16.7%). Finally, though the sample sizes were small, those who reported needing but not receiving paid personal assistance services (PAS, $n = 55$) were significantly more likely ($p < .001$) to report greater levels of loneliness and dissatisfaction with social activities compared to those who reported having paid PAS ($n = 135$; not shown). While not statistically significant, those who received only unpaid PAS services (e.g., from a spouse, family member or friend) also reported greater levels of loneliness and being unsatisfied with their level of social activity compared to those with paid PAS.

Regression results controlling for covariance among demographics indicated that only employment status and health status were consistently significant predictors of greater levels of social isolation, loneliness, and dissatisfaction with social activity among respondents with mobility disabilities (see Table 3). Specifically, being employed was significantly associated with lower odds of dissatisfaction with social activity (OR = 0.197, $p < .001$) and lower odds of feelings of social isolation (OR = 0.339, $p < .001$). Likewise, and to an even greater degree, those reporting fair or poor health were more than 2 times as likely to report very much social isolation (OR = 2.375, $p < .001$) and dissatisfaction with social activity (OR = 2.311, $p < .001$)). In addition to employment and health status, living in a rural area was a significant predictor of feeling socially isolated (OR = 1.943, $p = .030$); being female (OR = 2.129, $p = .001$) and being younger (OR = 2.507, $p < .01$) were significant predictors of dissatisfaction with social activity; being younger ($p < .001$) and having income above the federal poverty level ($p < .001$) were significant predictors of greater loneliness.

Discussion

Survey respondents with mobility disabilities were more likely to live in rural areas and were more likely to be white, older, unemployed, and smoke. Respondents' greater rates of rurality are not

Table 1
NSHD Wave 2 Participant Characteristics, weighted.

	Primary Disability Type[a]		*p*-value
	Physical/mobility[b] (n = 621)	Not physical/mobility[c] (n = 1535)	
DEMOGRAPHICS			
Age in years, mean (SD, range)	48.0 (13.8, 18−64)	41.7 (11.6, 18−64)	<.0001
Gender, %			
Female	52.5	51.4	.083
Male	47.3	46.4	
Other[d]	0.2	2.2	
Race/ethnicity, % non-White	30.2	36.9	<.01
Education level, % with no college	57.6	57.3	.901
Marital status, % married	8.4	7.4	.426
Parental status, % with kids under 19	19.2	20.4	.535
Population density, % rural	18.3	8.9	<.0001
Employed, %	44.7	54.1	<.001
Income level, % below FPL	35.9	34.4	.718
HEALTH STATUS			
Reports fair or poor health, %	41.2	41.7	.250
Smokes or uses tobacco products, %	22.7	19.5	<.05
COMMUNITY PARTICIPATION/SOCIAL CONNECTEDNESS			
Never has reliable transportation, %	3.4	2.2	.099
Not satisfied with level of social activity, %	21.9	22.1	.900
Often feels isolated from others, %	30.2	35.2	<.05
Loneliness Scale[e], mean (SD, range)	6.1 (1.9, 3−9)	6.2 (2.0, 3−9)	.301

FPL = Federal Poverty Level, 2019; p-values calculated using chi-square and ANOVA.
‖Rural classification based upon county of residence with population of <50,000 (micropolital and non-core categories) using county-level Rural Urban Community Area (RUCA) codes 1.8) (https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/).
   [a] Survey item: "Of the options listed below which ONE category would you use to describe your main disability or health condition?" (7 options in randomized order).
   [b] Five most frequently reported conditions of those who self-selected physical/mobility disability category include: 1) arthritis, 2) spinal cord injury, 3) cerebral palsy, 4) amputation or limb difference, 5) quadriplegia. Obtained from open-ended survey item: "What is your main disability or health condition? If you have more than one please list your main one first."
   [c] Other disability types include: mental illness/psychiatric, chronic illness or disease, intellectual/cognitive, developmental, sensory, and neurological.
   [d] Other gender includes non-binary, transgender, gender non-conforming, genderqueer, agender, two-spirit, intersex, etc. as written-in by respondents.
   [e] Loneliness Scale is comprised of the items* in the three rows above; minimum = 3 and maximum = 9, higher score indicates greater feeling of loneliness.

Table 2
Factors influencing social activity, social isolation, and loneliness for people with mobility disabilities.

Factor	Not Satisfied with Social Activity[a]	Feeling Very Much Social Isolation[b]	Mean (SD) Loneliness Scale Score[c]
Gender[d] (n = 605)			
Female	26.4%**	12.5%*	6.1 (1.8)
Male	16.7%**	17.4%*	6.0 (2.2)
Age Group[e] (n = 605)			
18-34	28.7%	17.8%	6.7 (1.8)**
35-64	20.6%	14.4%	6.0 (2.0)**
Population Density[f] (n = 621)			
Rural	21.1%	20.4%	6.2 (2.0)
Urban	22.0%	13.6%	6.1 (2.0)
Education Level (n = 602)			
No college	23.6%	14.7%	6.3 (1.9)**
Some college or degree	19.1%	14.5%	5.8 (2.0)**
Employment Status (n = 605)			
Not Employed	31.4%***	20.6%***	6.6 (1.9)***
Employed	9.8%***	7.6%***	5.5 (1.9)***
Race/Ethnicity (n = 581)			
White	19.2%*	13.4%*	5.9 (2.0)**
Non-White	28.7%*	20.8%*	6.5 (1.9)**
Income Level (n = 589)			
< Federal Poverty Level	22.0%**	19.9%**	6.5 (1.8)***
> Federal Poverty Level	16.5%**	10.2%**	5.8 (1.9)***
Health Status (n = 605)			
Fair or Poor Health	31.1%***	22.3%***	6.6 (1.9)***
Good, Very Good or Excellent Health	15.3%***	9.9%***	5.7 (1.9)***

*$p < .05$ **$p < .01$, ***$p < .001$; p-values calculated using ANOVA.
[a] Five-point Likert-like item: "I am satisfied with my current level of social activity."; p-values calculated using chi-square.
[b] Five-point Likert-like item: "I feel that I am isolated from others and my community."; p-values calculated using chi-square.
[c] Loneliness Scale is comprised of three items: "How often do you feel you lack companionship?" "How often do you feel left out?" and "How often do you feel isolated from others?", scored as hardly ever (1), sometimes (2), often (3), Range = 3-9.
[d] Other gender not included due to cell size <20.
[e] Based on US Census age group categories.
[f] Rural = county of residence population density <50,000 and (micropolitan & non-core categories) and Urban = county of residence population density >50,000 (metropolitan) using county-level Rural Urban Community Area (RUCA) codes (https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/).

Table 3
Regression analyses of social activity, social isolation, and loneliness among US adults with mobility disabilities (n = 569).

	Odds Ratio (β)	p-value	95% CI Lower	95% CI Upper
Not Satisfied with Level of Social Activity[a]				
gender, female	2.129	.001	1.353	3.351
age group, 18-34	2.507	<.01	1.417	4.436
Population density, rural	.804	.457	.452	1.429
Education, college	.961	.886	.557	1.659
Employed	.197	<.001	.117	.329
Race/Ethnicity, non-white	1.125	.627	.700	1.807
Income level, < 100% FPL	.692	.129	.430	1.113
Health status, fair/poor	2.311	<.001	1.498	3.565
Feeling Very Much Social Isolation[a]				
gender, female	.615	.054	.374	1.009
age group, 18-34	1.405	.288	.751	2.628
Population density, rural	1.943	.030	1.065	3.545
Education, college	1.333	.359	.721	2.464
Employed	.339	<.001	.197	.583
Race/Ethnicity, non-white	1.422	.190	.840	2.406
Income level, < 100% FPL	.962	.276	.898	1.031
Health status, fair/poor	2.375	<.001	1.459	3.865

Loneliness Scale[b,c]	T	β	p-value	95% CI Lower	95% CI Upper
gender, female	.465	.019	.642	-.238	.386
age group, 18-34	4.49	.180	<.001	.538	1.373
Population density, rural	-.389	-.016	.697	-.501	.335
Education, college	.026	.026	.544	-.260	.493
Employed	-.235	-.235	<.001	-1.25	-.613
Race/Ethnicity, non-white	.036	.036	.386	-.198	.513
Income level, < 100% FPL	-.145	-.145	<.001	-.033	-.010
Health status, fair/poor	.198	.198	<.001	.481	1.116

[a] Binary logistic regression.
[b] Linear regression.
[c] Loneliness Scale Range = 3−9, with higher scores indicating greater loneliness.

surprising given findings by Zhao et al.[19] that rates of mobility disability were greatest in rural areas and that the rural/urban difference for mobility disability was greater than for other disability types. The greater rurality of the mobility disability sample, in turn, likely explains its older age, higher unemployment level,[20] lower racial and ethnic diversity,[21] and higher smoking rate.[22]

Interestingly, however, despite their greater rurality, respondents with mobility disabilities did not report significantly less access to reliable transportation compared to other disability groups. Moreover, respondents in the mobility disability group were less likely to report feeling socially isolated when compared to people with other disabilities. This finding seems to reinforce that by Repke and Ipsen[11] that rural dwellers with disabilities are less likely to report social isolation than are their counterparts living in more urban settings given that the mobility disability group is significantly more rural than the other disabilities group.

Within the mobility disability group, our regression results show that being unemployed and in fair or poor health were both associated with significantly poorer scores on all three measures of social connectedness. These findings affirm those of Barclay et al.,[12] who found that health issues and lack of financial resources were barriers to participation for people with spinal cord injury, and Repke and Ipsen,[11] who found that employment is an important source of social connection for some people with disabilities. In the regression analyses, other differences on social connectedness measures due to demographics, such as race and education level, became non-significant, indicating their likely covariance with employment and health status.

Interestingly, *within* the mobility disability group, levels of social isolation were significantly greater for rural dwellers, a finding in disagreement with previous research.[11] To better understand this finding, we further examined the sub-sample of rural respondents with mobility disabilities and found that they disproportionately reported fair or poor health (56.1%, $n = 114$) compared to non-rural respondents with mobility disabilities (38.0%, $n = 508$, $p < .001$). In the other disabilities group, the corresponding figures for fair or poor health were 37.2% ($n = 137$) for rural and 42.2% for non-rural responders ($n = 1,398$, $p = .260$). Thus, it is likely that the poorer health of the rural sub-sample with mobility disabilities is driving the greater reports of social isolation.

Being female and being younger were both still significantly associated with being less satisfied with social activity, a finding seen in other population studies.[23] Similarly, being younger and having income above federal poverty level were associated with greater loneliness scores. Holt-Lundstad[5] noted that, among the general population, people under age 50 and particularly members of Generation Z and millennials, are more likely to report loneliness. Based on our results, this finding also seems to apply to younger people with mobility disabilities. Finally, the finding that those who reported needing but not receiving paid personal assistance services were more likely to report loneliness and less satisfaction with social activities underscores the importance of paid assistance for this population in terms of supporting improved physical and mental health.

Several limitations of this study are important to note. First, it uses survey data that were primarily collected online via the Qualtrics platform. While Qualtrics is fully accessible to people with disabilities, some research[24,25] has shown disparities in internet access and use between those with and without disabilities. In recent years, however, it has been shown that this disparity is lessening due to advancements in technology and the increased use of smartphones and tablets.[26,27] Further, our survey weighting methodology accounted for the availability of internet access. Another limitation of this study is that the community participation/social connectedness items utilized were pulled from the larger PROMIS item bank and/or short forms individually and/ or were modified slightly, limiting the ways in which findings from this study can be compared to other studies that utilize PROMIS items. Finally, our study used a subjective measure of perceived social isolation. However, several prior studies in the literature have used objective measures of social isolation.[8,28]

All of these findings have strong implications for service delivery and policy development. First and foremost, social connectedness must be recognized as a factor in overall health for people with disabilities, and service providers and medical professionals should consider this facet of people's lives as much as they consider other demographics and social determinants of health.[6] Thus, to the extent that social and medical service providers support and recommend exercise and other preventive health measures, they should also support opportunities for social interactions and connections. Because research has shown that access to preventive care and health recommendations from medical providers lag for people with disabilities, however, specialized efforts will likely be necessary to improve provider practices in recommending and supporting increased social connections for this population.[24,29]

Moreover, for people with mobility disabilities, being unemployed and in fair or poor health were both associated with decreased measures of connectedness. Other research has suggested that employment is associated with improved health for people with disabilities,[30] but current findings suggest that social connections developed through employment may be as important as improved financial status in improving outcomes. Similarly, while paid personal assistance services (PAS) are a mechanism to directly support activities of daily living for people with mobility disabilities, they also seem to play an important role in supporting social connectedness and, thus, overall health for this population.

Finally, findings suggest that interventions or programs to support social connectedness might need to vary by age and gender for people with mobility disabilities. Younger individuals, in particular, might benefit from programs to address loneliness, and females might need supports to facilitate social activities (e.g., respite care).

Presentation

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