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The Association of Gait Speed and Self-Reported Difficulty Walking with Social Isolation: A Nationally-Representative Study

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Abstract

Background: Mobility assessments are commonly used among older adults as risk stratification for falls, pre-operative function, frailty, and mortality. We determined if gait speed and self-reported difficulty walking are similarly associated with social isolation and loneliness, which are key markers of social well-being and linked to health outcomes.

Methods: We used 2015–2016 data from the National Social life Health and Aging Project (NSHAP), an in-person nationally-representative survey of 2,640 community-dwelling adults 65 years old. We measured gait speed (timed 3-meter walk: unable to walk, 5.7 seconds, and <5.7 seconds), and self-reported difficulty walking one block or across the room (unable, "much," "some," or "no" difficulty). Social measures included loneliness (3-item UCLA scale), social isolation (12-item scale), and individual social activities (frequency socializing, religious participation, community participation, and volunteering). We used logistic regression to determine the adjusted probability of each social measure by gait speed and difficulty walking, adjusting for sociodemographic and health characteristics, and tested for interaction terms with age.

Results: Participants were on average 75 years old (SD=7.1), 54% female, 9% Black/African American, and 6% Hispanic. Difficulty walking one block was associated with (p<0.05):

social isolation (much difficulty: 26% vs no difficulty: 18%), low socializing (33% vs 19%), low volunteering (67% vs 53%), low community participation (54% vs 43%), low religious participation (51% vs 46%), and loneliness (25% vs 14%). Difficulty walking across the room was similarly strongly associated with social isolation and individual activities. The association between self-reported difficulty walking and social isolation was stronger at older ages (p-value of interaction <0.001).

Conclusions: Self-reported mobility difficulty is a widely used clinical assessment that is strongly associated with loneliness and social isolation, particularly at older ages. Among persons with limited mobility, clinicians should consider a careful social history to identify social needs and interventions addressing mobility to enhance social connections.

INTRODUCTION

Social isolation and loneliness are powerful predictors of health outcomes among older adults.[1] Social isolation is an objective deficit in connections to family, friends, or the community, and loneliness is the emotional distress related to perceived inadequacy of existing social connections. Despite growing evidence of their relevance to health, these social needs are not routinely addressed in clinical visits due to limited time and lack of awareness among clinicians. If existing clinical assessments strongly predict social isolation or loneliness, these could aid in targeted screening efforts and informing clinical interventions.

Gait speed and mobility are appealing candidate assessments as they are commonly included in Medicare Annual Wellness visits, and are used broadly for risk stratification for falls, pre-operative function, and mortality.[2] Furthermore, gait speed is often used as a single indicator of frailty and mortality.[3] Prior studies suggest that gait speed alone may predict social isolation and loneliness,[4–6] but it is unclear if standardized assessments of gait speed and relevant cut-offs are necessary or if brief, self-reported measures of walking difficulty are adequate. Our objective was therefore to determine if gait speed, including a previously established 5.7 second cut-off, or self-reported difficulty walking are associated with loneliness and social isolation.

METHODS

Study Sample

We used the nationally-representative National Social Life Health and Aging Project (NSHAP) Round 3 cohort (collected between September 2015 through November 2016), including 2,687 community-dwelling adults 65 years old. The NSHAP cohort is a multi-stage probability sample with oversampling of African Americans and Hispanic older adults; the cohort design is described extensively elsewhere.[7,8] The survey includes an in-person questionnaire, biomeasure collection, and a leave-behind questionnaire (leave-behind response rate: 84%). We excluded respondents who had missing information on gait speed (n=47) yielding a final sample size of 2,640 participants.

Social Measures

Loneliness was measured using a 3-item UCLA Loneliness scale (Range: 0–6 points), with ≥3 points categorized as lonely.[9] We measured social isolation using a previously-described 12-item scale assessing three domains of relationships: household/core social network size (marital status, household size, confidantes, and number of children, close relatives, and friends); socializing with friends, relatives, and neighbors; and community engagement in volunteering, community groups, and religious services.[10] Social isolation was categorized based on the lowest quintile of the scale. We further examined individual activities within the social isolation scale, including few relationships (lowest quintile), low socializing (less than monthly), low volunteering (less than 3x/year), low community group participation (less than 3x/year), and low religious service attendance (less than 3x/year).

Mobility Assessments

Gait speed was measured via a 3-meter usual walk, marked with a pre-cut string; participants were asked to walk at a usual pace, allowing the use of a walking aid. It was categorized based on previous thresholds for the Short Physical Performance Battery (unable to walk, ≥5.7 seconds, <5.7 seconds).[11] "Difficulty walking across the room" and "difficulty walking one block" were measured by self-report (Responses: "no difficulty," "some" or "much" difficulty, and "unable to do"), excluding difficulties expected to resolve in 3 months.

Sociodemographic and Health Covariates

Demographic and health measures included age, gender, self-reported race/ethnicity (White, Black, Hispanic, and "Another Race/Ethnicity"), education (less than High School, High School/GED, Some college, Bachelors or more), depressive symptoms (9+ points using a modified Center for Epidemiologic Studies 9-item scale),[12] and multimorbidity,[13] including coronary artery disease, heart failure, cancer, metastatic cancer, osteoarthritis, diabetes, COPD or asthma, prior stroke, or dementia diagnosis.

Statistical Analysis

We fit separate logistic regression models to determine if gait speed and self-reported difficulty walking were associated with each social measure, after adjusting for age, gender, race/ethnicity, marital status, education, depressive symptoms, and multimorbidity. We report the model-derived adjusted probabilities of each social measure by level of gait speed or self-reported difficulty walking. In each model, we tested the significance of interaction terms between mobility measures and select characteristics (age, gender, marital status, and living alone). Analysis revealed a relatively consistent interaction term ($p<0.1$) between age and mobility and risk of social isolation; we therefore present the adjusted probabilities of social isolation stratified by age and mobility derived from multiple regression models. All analyses utilized sample weights to account for the complex sampling design and differential probability of response to in-person and leave-behind questionnaires and to provide estimates of population parameters. We did not adjust for multiple comparisons as the goal of the analysis was exploratory in nature.[14] All analyses were performed using STATA 17.0.

RESULTS

Participants were on average 75 years old (SD = 7.1, 65–69: 37%, 70–79: 42%, 80+: 21%), 54% female, 67% married, 9% Black/African American, 6% Hispanic, Non-White, and 27% lived alone (Table 1). Approximately 84% of participants had normal gait speed, 79% no self-reported difficulty walking one block, and 89% no self-reported difficulty walking across the room.

Results from multivariable regression models for gait speed, difficulty walking one block, and difficulty walking across the room are displayed in Figure 1. Gait speed had no significant associations with social measures, although there were statistical trends for social isolation (p=0.11), reduced socializing (p=0.12), and community engagement (p=0.06) (Figure 1A). Difficulty walking one block had significant associations across all social measures, other than few social relationships (Figure 1B). Notably, difficulty walking one block had a different association with loneliness compared to other social measures (unable to walk: 12%, much difficulty: 25%, some difficulty: 21%, no difficulty: 14%). Difficulty walking across the room was strongly associated with social isolation, and low volunteering, community engagement, and religious participation (Figure 1C).

There were significant interaction terms between age and each mobility measure in risk of social isolation (gait speed: p=0.07; difficulty walking one block: p-value = 0.0002; difficulty walking across the room: p<0.0001). In each case, the strength of the association between mobility and social isolation was stronger with older ages of participants (Figure 2). Lastly, as there are several gait speed thresholds and cut-offs considered clinically relevant as compared with cut-offs used in our study, we conducted sensitivity analyses using different cut-offs and gait speed as a continuous variable which yielded similar results.

DISCUSSION

In a nationally-representative sample of community-dwelling older adults, self-reported difficulty walking one block or across the room was strongly associated with social isolation, loneliness, and specific types of social activities. Nearly one third of individuals reporting difficulty walking a block or across the room experienced social isolation, loneliness, or low socializing with friends and relatives. Over half of individuals with self-reported walking difficulty (and in some cases up to 80–90% of these participants) experienced low community engagement across volunteering, community groups, and religious services. Notably, results indicate that the association between mobility impairment and social isolation was stronger at older ages; at the age of 75 and older the prevalence of social isolation was 2–3 times higher for those with self-reported walking difficulty compared to those without difficulty. Consequently, clinicians should consider paying particular attention to addressing social isolation among adults over the age 75 with mobility impairment.

Objective gait speed had a similar relationship to each social measure as self-reported difficulty walking, however associations did not reach statistical significance. There are several potential explanations as to why there was a discrepancy between objective gait

speed and subjective mobility measures. One possibility is that reductions in objective gait speed are a precursor to self-reported difficulty walking; consequently, outward changes in social activities may be less pronounced with slow gait. A second potential explanation relates to a recent study demonstrating that self-perceived physical limitations can lead to guilt and a perception of being a burden to others.[15] These perceptions might lead to social withdrawal, loneliness, and isolation even in the absence of objectively slow gait. Lastly, it is possible that subjective assessments of mobility pick up on subclinical conditions, coping resources, and health behaviors that are missed with gait speed assessments and impact social activities.[16] Taken together, simple self-reported mobility measures appear to capture a broad picture of social needs, and the three measures together may be helpful in risk assessments for social isolation and loneliness.

Results have at least two notable clinical implications. First, clinical teams should consider a careful social history for those with difficulty walking to identify and address social isolation and barriers to community engagement. Gait speed and self-reported difficulty walking join other clinical assessments and conditions that have a strong association with social isolation, particularly at older ages, including frailty, serious illness,[17] and dementia.[6,18,19] Second, results point to opportunities to enhance social connections by addressing impaired mobility, including facilitating transportation to social activities, providing walking assistive devices, and improving physical capacity. Importantly, addressing *perceptions* of impaired mobility (whether or not there is an actual gait impairment) may be similarly important in facilitating social connection. This may include normalizing changes in mobility with aging, promoting health-seeking behaviors, and simple encouragement to attend activities.[15] These strategies can be tested in future trials focused on reducing social isolation through addressing mobility impairment.

Our study has limitations. First, we use cross-sectional data, which limits our ability to draw causal conclusions. Second, data is focused on community-dwelling older adults who are independently able to participate in a 2 hour survey; findings may therefore not be generalizable to individuals residing in nursing or assisted living facilities, and individuals with moderate to severe cognitive impairment.

In summary, mobility difficulty as identified by simple, routine clinical assessments was associated with social isolation, loneliness and reduced social activity among older adults. Self-reported mobility difficulty may play a role in clinical screening efforts for social isolation and loneliness, and addressing mobility is a potentially modifiable clinical factor for improving social connection.

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KEY POINTS:

- In a nationally-representative cohort of 2,640 community-dwelling adults 65 years old, self-reported difficulty walking one block was strongly associated with social isolation, loneliness, and low involvement in specific social activities such as socializing with family or friends, volunteering, attending community groups, and attending religious services.

- The association of self-reported difficulty walking and social isolation was stronger at older ages.

Why does this matter?

Mobility difficulty as identified by simple, routine clinical assessments is associated with social isolation, loneliness and reduced social activity among older adults; consequently, addressing mobility is a potentially modifiable clinical factor for improving social connection.
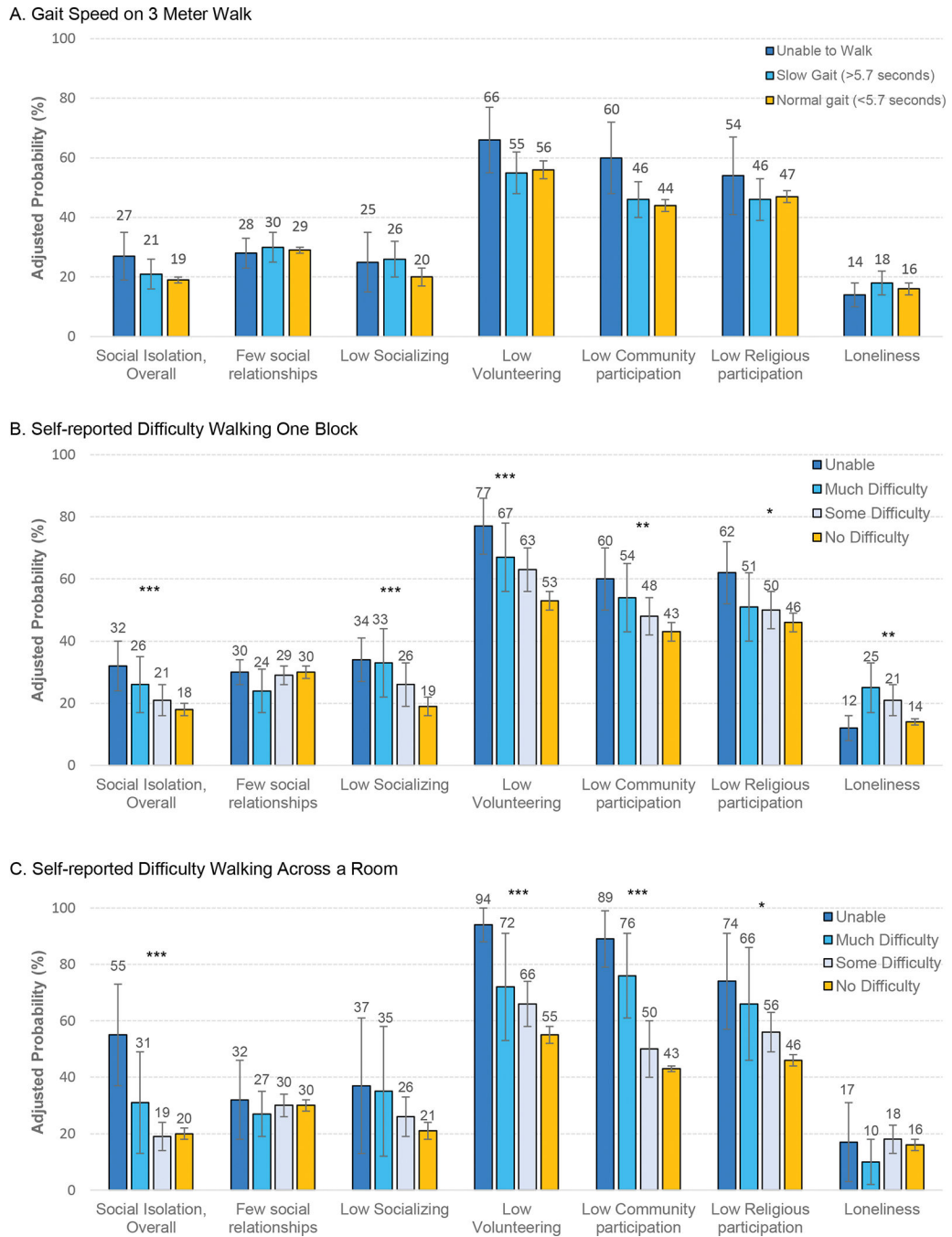
Figure 1.
Adjusted Association Between (A) Gait Speed, (B) Difficulty Walking One Block, and (C) Difficulty Walking Across the Room with Social Isolation, Social Isolation Domains, and Loneliness.

Adjusted Probabilities are derived from multivariate logistic regression models adjusting for age, gender, race/ethnicity, marital status, education, depression, and comorbidities. P-values are denoted by <0.05 (*), <0.01 (**), and <0.001 (***). Social isolation was measured using a 12-item scale including: Marital status, Living Alone, Core Social

Network Size, Frequency of Talking with Core Social Network, Number of Children, Number of Close Family, Number of Close Children, Frequency of Socializing with Friends and Family, Frequency of Neighbor Visits, Volunteering, Community Groups, and Religious participation. Loneliness was measured using the UCLA 3-item loneliness scale (Range 3–9 points, cut-off: 7+ points). Gait speed was measured using a 3-meter walk, marked with a pre-cut string and categorized based on previous thresholds for the Short Physical Performance Battery (unable to walk, 5.7 s, <5.7 s). Self-reported difficulty walking was determined by two questions: "difficulty walking across the room" or "difficulty walking one block" (Responses: "no difficulty, " "some difficulty," "much difficulty," and "unable to do"), excluding difficulties that are expected to resolve in 3 months.
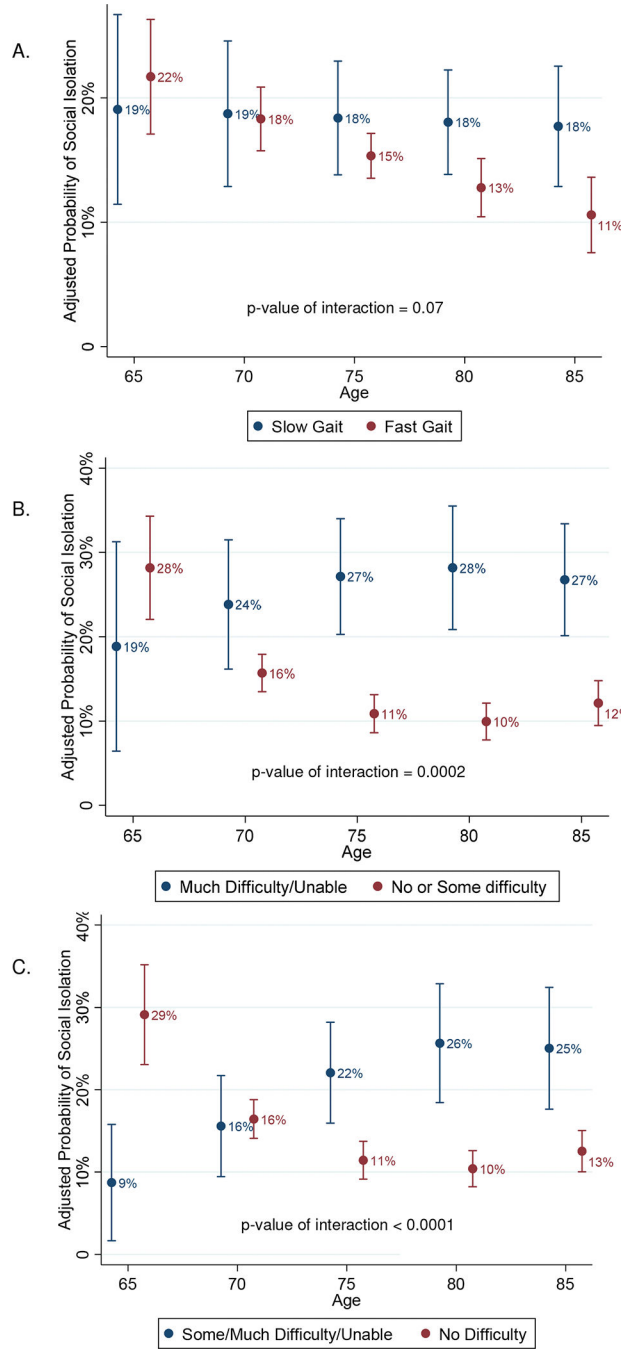
Figure 2.
Adjusted Probability of Social Isolation Stratified by (A) Gait Speed, (B) Difficulty Walking
One Block, and (C) Difficulty Walking Across the Room, and Age of Participants.
Adjusted Probabilities are derived from multivariate logistic regression models adjusting
for age, gender, race/ethnicity, marital status, education, depression, and comorbidities.
Interaction p-values indicate whether interaction terms between age (as a continuous
variable) and each mobility measure are significant. Error bars represent 95% confidence
intervals. Social isolation was measured using a 12-item scale including: Marital status,

Living Alone, Core Social Network Size, Frequency of Talking with Core Social Network, Number of Children, Number of Close Family, Number of Close Children, Frequency of Socializing with Friends and Family, Frequency of Neighbor Visits, Volunteering, Community Groups, and Religious participation. Gait speed was measured using a 3-meter walk, marked with a pre-cut string and categorized based on previous thresholds for the Short Physical Performance Battery (unable to walk, 5.7 s, <5.7 s). Self-reported difficulty walking was determined by two questions: "difficulty walking across the room" or "difficulty walking one block" (Responses: "no difficulty, " "some difficulty," "much difficulty," and "unable to do"), excluding difficulties that are expected to resolve in 3 months.

Table 1.

Sample characteristics in the NSHAP Wave 3 cohort (n=2,624)

Characteristics		Overall*	Gait Speed*5			Difficulty Walking One Block*6			
		No. (%)	Normal Gait	Slow/ Unable	p-value	No Difficulty	Some Difficulty	Much/ Unable	p-value
Age	65–69	728 (37)	632 (85)	96 (15)		584 (80)	89 (12)	54 (8)	
	70–74	697 (26)	552 (78)	145 (22)		514 (74)	117 (16)	65 (10)	
	75–79	500 (16)	370 (75)	130 (25)	<0.01	333 (69)	93 (17)	71 (14)	<0.01
	80–84	389 (12)	235 (63)	154 (37)		238 (64)	78 (18)	69 (18)	
	85+	326 (9)	142 (47)	184 (53)		152 (49)	78 (24)	89 (27)	
Gender	Female	1435 (54)	1013 (74)	422 (26)	0.06	946 (69)	270 (17)	210 (14)	0.03
	Male	1205 (46)	918 (78)	287 (22)		875 (75)	185 (14)	138 (11)	
Race/ Ethnicity	White	1928 (82)	1489 (78)	439 (22)		1342 (72)	332 (16)	246 (13)	
	Black	358 (9)	191 (58)	167 (42)	<0.01	221 (68)	67 (14)	66 (18)	0.13
	Hispanic	277 (6)	195 (76)	82 (24)		200 (75)	44 (16)	30 (9)	
	Another Race	69 (3)	52 (69)	17 (31)		53 (82)	10 (9)	5 (7)	
Education	<High School	432 (13)	234 (58)	198 (42)		239 (57)	95 (23)	90 (20)	
	HS/GED	643 (25)	452 (73)	191 (27)	<0.01	427 (68)	117 (16)	95 (16)	<0.01
	Some college	848 (33)	646 (78)	202 (23)		586 (71)	151 (17)	108 (12)	
	Bachelors+	717 (29)	599 (84)	118 (16)		569 (82)	92 (11)	55 (7)	
Marital Status	Unmarried	886 (37)	561 (68)	325 (32)	<0.01	539 (66)	169 (16)	170 (18)	<0.01
	Married	1754 (63)	1370 (80)	384 (20)		1282 (75)	286 (15)	178 (10)	
Household size	Living Alone	629 (27)	415 (70)	214 (30)	0.01	399 (73)	120 (15)	105 (12)	0.11
	Not Alone	2011 (73)	1516 (78)	495 (22)		1422 (68)	335 (18)	243 (14)	
Social Isolation[1]	Social Isolation	519 (20)	321 (69)	198 (31)	0.004	305 (63)	96 (16)	114 (21)	<0.01
	Not Isolated	2121 (80)	1610 (77)	511 (23)		1516 (74)	359 (15)	234 (11)	
Loneliness[2]	None/Low	1930 (84)	1495 (79)	435 (21)	<0.01	1407 (76)	304 (14)	211 (10)	<0.01
	Moderate/high	388 (16)	243 (68)	145 (32)		216 (56)	101 (25)	69 (19)	
Depression[3]	Normal (0–8 pts)	2054 (79)	1614 (81)	440 (19)	<0.01	1553 (79)	297 (13)	190 (8)	<0.01
	Mild/Mod (9+ pts)	585 (21)	316 (57)	269 (43)		268 (46)	157 (26)	158 (29)	
Comorbid Conditions[4]	0	1041 (39)	853 (83)	188 (17)		849 (84)	132 (11)	55 (5)	
	1	897 (35)	641 (74)	256 (26)	<0.01	607 (70)	167 (16)	121 (14)	<0.01
	2 or 3	583 (22)	371 (68)	212 (32)		313 (58)	128 (21)	135 (21)	
	4+	`119 (4)	66 (57)	53 43)		52 (43)	28 (27)	37 (30)	

Characteristics		Overall*	Gait Speed*5			Difficulty Walking One Block*6			
Gait Speed5	Unable to Walk	148 (6)	-	-		25 (20)	22 (19)	98 (61)	
	Slow Gait (>5.7s)	561 (19)	-	-	-	240 (47)	157 (25)	155 (28)	<0.01
	Normal (<5.7s)	1931 (76)	-	-		1556 (82)	276 (13)	95 (5)	
Walking One Block6	Unable to Walk	198 (7)	35 (21)	163 (79)		-	-	-	
	Much difficulty	150 (6)	60 (45)	90 (55)	<0.01	-	-	-	-
	Some Difficulty	455 (15)	276 (63)	179 (37)		-	-	-	
	No Difficulty	1821 (72)	1556 (86)	265 (14)		-	-	-	
Walking Across Room6	Unable to Walk	31 (1)	0 (0)	31 (100)		0 (0)	0 (0)	31 (100)	
	Much difficulty	70 (2)	1 (1)	69 (99)	<0.01	2 (6)	4 (9)	61 (86)	<0.01
	Some Difficulty	295 (10)	111 (43)	184 (57)		15 (6)	124 (37)	153 (57)	
	No Difficulty	2244 (87)	1819 (82)	425 (18)		1804 (82)	327 (13)	103 (5)	

Abbreviations: NSHAP – National Social life Health and Aging Project

*Column percentages are used for the "Overall" whereas Row percentages are used for gait speed and difficulty walking one block; Percentages shown in parentheses may not match numbers due to use of sample weights and complex survey design.

[1] Social isolation was measured using a 12-item scale including: Marital status, Living Alone, Core Social Network Size, Frequency of Talking with Core Social Network, Number of Children, Number of Close Family, Number of Close Children, Frequency of Socializing with Friends and Family, Frequency of Neighbor Visits, Volunteering, Community Groups, and Religious participation.

[2] Loneliness was measured using the UCLA 3-item loneliness scale (Range 3–9 points).

[3] Depression was measured using a modified Center for Epidemiologic Studies 9-item scale.

[4] Comorbidities included coronary artery disease, heart failure, cancer, metastatic cancer, osteoarthritis, diabetes, COPD or asthma, prior stroke, or dementia.

[5] Gait speed was measured using a via a 3-meter walk, marked with a pre-cut string and categorized based on previous thresholds for the Short Physical Performance Battery (unable to walk, 5.7 s, <5.7 s).

[6] Self-reported walking was determined by two questions: "difficulty walking across the room" or "difficulty walking one block" (Responses: "no difficulty, " "some difficulty," and "unable to do"), excluding difficulties that are expected to resolve in 3 months. P-values were determined using Rao-Scott Chi-Square tests.