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Physical Function and Health Status in Aging Puerto Rican Adults: The Boston Puerto Rican Health Study

Carmen Castaneda-Sceppa, MD, PhD^{1,2}, Lori Lyn Price, MAS³, Sabrina E. Noel, RD, PhD², Jennifer Bassett Midle, MPH³, Luis M. Falcon, PhD¹, and Katherine L. Tucker, PhD²

¹Northeastern University, Boston, Massachusetts

²Tufts University, Boston, Massachusetts

³Tufts Medical Center, Boston, Massachusetts

Abstract

Objectives—This article describes physical function in Puerto Rican older adults and examines associations between health status and physical function. It also assesses relationships between physical function and disability.

Method—This study uses a cross-sectional study of Puerto Ricans 45 to 75 years in Boston ($N = 1,357$). Measures included performance-based physical function (handgrip strength, walking speed, balance, chair stands, foot tapping), health conditions (obesity, diabetes, depressive symptomatology, history of heart disease, heart attack, stroke, and arthritis), and self-reported disability (activities of daily living, instrumental activities of daily living).

Results—Older women (60–75 years) had the poorest physical function. Poor physical function was associated with obesity, diabetes, depression, history of heart attack, stroke, and arthritis, after adjusting for age, sex, education, income, and lifestyle ($p < .05$). Physical function and disability were correlated ($p < .01$).

Discussion—Health status among Puerto Ricans appears to contribute to poor physical function. Targeted interventions to improve strength, endurance, and balance are needed to combat physical frailty and its consequences in this population.

Keywords

Puerto Ricans older adults; physical function; physical frailty; health status

Poor physical function is the hallmark of physical frailty and an important component in the disablement process (Nagi, 1976). Nagi (1976) described the epidemiology of this process as a sequence of events starting with acquisition of pathology (disease, injury), followed by impairment and poor physical function (mobility and balance) leading to disability (Nagi,

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Corresponding Author: Katherine L. Tucker, PhD, Professor and Chair, Department of Health Sciences, 360 Huntington Avenue, 316 Robinson Hall, Northeastern University, Boston, MA 02115 kl.tucker@neu.edu.

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1976). Often, self-reported disability is used to predict adverse outcomes, institutionalization, and death (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995). However, performance-based measures of physical function can objectively capture physical abilities and can identify declines in function and impairment in people who may not yet be disabled. In fact, data from the Cardiovascular Health Study in well-functioning older community-dwelling adults showed that 7% of these individuals have poor physical function and are therefore considered frail (Fried et al., 2001).

Factors associated with poor physical function include age-related declines in muscle mass and muscle function (or sarcopenia; Rosenberg, 1997), advanced age, female sex, physical inactivity, low socioeconomic status (Fried et al., 2001), and minority status (Baldwin, 2003). Hispanics, the fastest growing population in the United States, bear a disproportionate burden of disability (Centers for Disease Control and Prevention, 2004). Data from the Third National Health and Nutrition Examination Survey (NHANES III) in persons above 60 years of age showed significantly higher prevalence of self-reported disability among non-Hispanic Black and Mexican American men and women than in non-Hispanic Whites (NHW; Ostchega, Harris, Hirsch, Parsons, & Kington, 2000). Most recently, data from the National Health Interview Survey (NHIS) showed that adults with both mobility limitations (defined as self-reported difficulty walking and moving around) and minority status experienced the greatest disparities in disability. This includes difficulty with activities of daily living (ADL; 42.7%) and with instrumental activities of daily living (IADL; 27.7%; Jones & Sinclair, 2008). The ancestral origin self-reported by Hispanics in the NHIS included Mexican (53%), Puerto Rican (12%), Cuban (7%), and Other (28%; Jones & Sinclair, 2008).

Most epidemiologic information on any one component of the disablement process among Hispanics has focused on Mexican Americans, due to their majority as a subgroup. However, evidence suggests that health outcomes vary significantly by Hispanic ethnic subgroup (Barcelo, Gregg, Pastor-Valero, & Robles, 2007). We are particularly interested in the Puerto Rican population living in the Northeast part of the United States because it is the largest Hispanic subgroup of that region (U.S. Census Bureau, 2004) with documented health disparities (Baldwin, 2003). National data show that 21% of older Puerto Ricans reported having an activity limitation, compared with 15% of Cuban or Mexican Americans (Hajat, Lucas, & Kington, 2000). In a representative sample of Puerto Rican adults 60 years of age and older living in Massachusetts, 73% of Puerto Rican women reported difficulty with at least one ADL, compared to 64% of NHW women living in the same neighborhoods (Tucker, Falcon, Bianchi, Cacho, & Bermudez, 2000). This important finding, however, leads to the question of whether subjective reporting of one's physical abilities may be influenced by self-perceived general health, access to health care, and/or health inequalities—issues that have been shown to particularly influence Mexican American (Angel, Angel, & Markides, 2003) and African American (Ferraro & Koch, 1994) populations. Therefore, the objectives of the present study were to (a) describe physical function (ascertained by objective performance-based measures) in Puerto Rican women and men between 45 to 75 years of age, (b) examine the independent associations between health status and physical function in this population, and (c) determine the relationships between measured physical function and self-reported disability.

Method

Study Population

This analysis used data from the Boston Puerto Rican Health Study, a longitudinal study funded by the National Institutes of Health as part of the Centers for Population Health and Health Disparities. Detailed study methods are reported elsewhere (Tucker et al., 2010). Briefly, participants were recruited from the Greater Boston and surrounding areas using door-to-door enumeration to identify Hispanics between 45 to 75 years of age. More than 17,250 doors were approached and visited at least three times and up to six times on different days of the week, weekends, and at varying times of day in an attempt to reach those who were not at home during initial enumeration. Households with at least one eligible adult were identified and one participant per qualified household was invited to participate. The majority (80.4%) of participants were identified through door-to-door enumeration. However, participants were also identified during major community festivals/ fairs and events (8.9%), through referrals from participants and ineligible individuals (6.1%), and through calls to the study office from flyers distributed at community locations (4.6%). Individuals who were unable to answer questions due to serious health conditions planned to move away from the area within 2 years or who had a low mini mental state examination (MMSE) score (< 10) were excluded from participation. A total of 1,742 Puerto Rican adults (45-75 years) agreed to participate, 9 were excluded due to low MMSE, 14 dropped out, 37 were lost to follow up, and 5 failed to complete the interview despite continued agreement to do so. A total of 1,432 completed the interview. Of these, 1,357 participants had double data entered and cleaned data and were included in this analysis. Written informed consent approved by the Institutional Review Board at Tufts Medical Center was obtained in the language of preference (Spanish or English) before study participation.

Measures

Physical function, the main outcome of this investigation, refers to objective performance-based measures of physiological domains, including strength, balance, mobility, and motor coordination (Guralnik et al., 1995; Seeman et al., 1994). Poor physical function refers to impairment or inability to perform any of these physiological domains (Ferrucci et al., 2004). Physical disability was ascertained with the ADL (Katz, Ford, Moskowitz, Jackson, & Jaffee, 1963) and the IADL (Lawton & Brody, 1969) questionnaires.

Performance-based measures of physical function include the following: Handgrip strength was measured using a dynamometer (Smedley Hand Dynamometer, Stoelting Co, Wood Dale, IL). Three trials on each hand were performed and the average of these measures from the dominant hand was used for analysis. Lower-extremity physical function was determined by four timed tests, including walking, standing balance, chair stands, and foot-tapping coordination, adapted from the MacArthur Studies of Successful Aging (Guralnik et al., 1995; Seeman et al., 1994). Two timed 10-ft walking tests were performed, first at a normal and then at a faster pace. Participants needing more than 15 s to complete the 10-ft walk or unable to walk were assigned a value of 16 s. For balance, participants were asked to maintain their feet in the tandem position for 10 s with their eyes open. They were given a score of 1 if they could hold the tandem position for 10 s or 0 if they were unable. For the

timed chair stand, participants were asked to fold their arms across their chest and stand up from a chair once. If they successfully rose from the chair, they were asked to stand up and sit down five times as quickly as possible and the time this took in seconds was recorded. Participants whose time score was >30 s, and those who were unable to do five chair stands, were assigned a value of 31 s. The foot-tapping coordination test assessed the time in seconds it took to complete 10 foot taps (tapping one foot back and forth 10 times between two circles 12 in apart on a mat placed in front of the participant while seated). The test was assessed separately for each foot and the slowest time was used for analysis. Participants unable to complete this task with either foot, or those needing more than 30 s to complete this task, were assigned a value of 31 s.

Poor physical function was defined by the following impairments or inabilities: handgrip strength impairment—strength measures falling within the lower two tertiles (ascertained separately for men and women; Rantanen et al., 2003); poor walking speed—slowest time walked equivalent to <0.4 m/s (Rolland et al., 2004); poor balance—a score <10 s while maintaining a tandem stand; poor chair stand time—a score >11.2 s (Guralnik et al., 1995; Seeman et al., 1994); poor foot tapping coordination—a score >9.8 s (above the median time it took to complete the 10-ft taps).

Self-reported ability to perform 12 ADL tasks (Katz et al., 1963) and 6 IADL tasks (Lawton & Brody, 1969) were ascertained from a series of questions, each with four possible responses depending on the level of difficulty (from 0 = *for no difficulty*, 1 = *for some difficulty*, 2 = *for a lot of difficulty*, and 3 = *unable to do*). Summary scores were also calculated separately for ADL and IADL from the sum of the responses on each questionnaire. Best and worst possible summary scores for ADL are 0 and 36 and for IADL 0 and 18, respectively.

Health status was ascertained by the prevalence of health conditions as follows: obesity—body mass index (BMI) >30 kg/m² (National Heart, Lung, and Blood Institute [NHLBI], 2001); abdominal obesity—waist circumference >88 cm in men and >102 cm in women (NHLBI, 2001); type 2 diabetes—fasting plasma glucose ≥126mg/dl or use of diabetes medications (American Diabetes Association, 2002); depressive symptomatology—score ≥16 on the Center for Epidemiologic Studies Depression Questionnaire (CES-D; Radloff, 1977). Finally, history of heart disease, heart attack, stroke, and arthritis were ascertained by self-report in response to questions asking whether they have ever been diagnosed with each condition by a physician.

Covariates

Age, sex, education, poverty level, smoking, alcohol consumption, and physical activity were assessed by self-report. Poverty status was determined using the yearly poverty thresholds released by the U.S. Census Bureau (U.S. Census Bureau, 2009). Each participant's total annual household income was compared to the threshold, based on the age of the head of household, participant's family size, and year of interview. If total household income was less than this threshold, the participant was considered to live in poverty. Smoking was categorized past or current versus never. Alcohol consumption was classified as nondrinker or light (<1 drink/day), moderate (up to 1 drink/day for women and 2 drinks/day for men), or heavy drinkers (>2 drinks/day; Krauss et al., 2000). Physical activity

was estimated using a modified version of the Harvard Alumni Physical Activity Questionnaire (Paffenbarger, Hyde, Wing, & Hsieh, 1986). Participants were asked for the hours per day (week and weekend days) spent in sleep, sedentary (sitting), and light, moderate, and heavy (vigorous) activities, each multiplied by the weighting factors 1.0, 1.1, 1.5, 2.4, and 5.0, respectively. Tertiles of physical activity levels from none/ little (lowest tertile) to some (highest tertile) activity were calculated from physical activity scores. These tertiles were used for analysis.

Statistical Analysis

Statistical analysis was performed using SAS version 9.1 (SAS Institute Inc, Cary, NC) with a two-tailed $p = .05$ for statistical significance. Data are presented as mean and standard deviation for continuous variables and percentages for categorical variables. Participant characteristics, performance-based physical function measures, and self-reported ADL and IADL disability per age group (45-59 and 60-75 years) were compared by sex. Comparisons were made using t tests for normally distributed continuous variables and chi-square tests for categorical variables. Associations between physical function measures and health conditions were assessed by multivariable regression models using binary logistic regression for handgrip strength impairment (strength in kilograms in the bottom two tertiles of performance), poor walking speed (<0.4 m/s), and poor balance (tandem stand maintained <10 s) or by linear regression for the time it took to raise from a chair five times and to perform the foot-tapping coordination test, both measured in seconds. Each model was adjusted for covariates (age group, sex, education, poverty level, tertiles of physical activity level from none/little [lowest tertile] to some [highest tertile], smoking status [current, past, never], and alcohol consumption [moderate, heavy, light/nondrinker]). Covariates were forced into each model. Health conditions (obesity, abdominal obesity, type 2 diabetes, depressive symptomatology, heart disease, heart attack, stroke, and arthritis) were entered into a forward stepwise regression if they met the .05 significance level. Finally, we examined the relationship between performance-based physical function measures (handgrip strength in kg and 10-ft walk, poor balance, chair stand, and foot taps [all in seconds]) and self-reported ADL and IADL disability summary scores by age group, using partial correlation coefficients adjusted for covariates, as listed above.

Results

Participant characteristics

Mean ages were 57.4 ± 7.5 years for women and 56.7 ± 7.9 years for men and 70% of the sample were women. Compared to men, more women in the younger (45-59 years) and older (60-75 years) age groups fell below the poverty level and fewer of them reported past or current smoking history or moderate or heavy alcohol consumption (Table 1). Physical activity scores in this sample ranged from 24.3 (none/little) to 62.6 (some) with approximately 50% reporting none or little physical activity level, as shown by scores <30 . Mean physical activity scores were 31 ± 4 for women and 32 ± 6 for men. Older women were significantly more sedentary than men in the same age group (Table 1). Health status was compromised in this population, as seen by the high prevalence of several health conditions. Prevalent obesity (overall or abdominal), depressive symptomatology, and

arthritis were significantly higher in younger and older women than their men counterparts, whereas heart attack was significantly higher in younger men than younger women (Table 1).

Performance-based measures of physical function

Both younger and older women had significantly poorer handgrip strength (<22 kg; Rantanen, 2003) and walking speed than men in the same age groups. In addition, a significantly greater proportion of older women had poor balance, and, on average, older women took longer to perform the chair stand and foot-tapping tests than older men (Table 2).

Associations between health status and physical function

Participants with depressive symptomatology, stroke, or arthritis were significantly more likely to have impaired handgrip muscle strength than their counterparts, independently of sociodemographics and lifestyle factors known to be associated with impairment. In contrast, however, greater abdominal obesity was associated with less likelihood of low handgrip strength (Table 3). Obesity and depressive symptomatology were significantly associated with likelihood of having mobility disability. Poor balance was associated with obesity and history of heart attack, stroke, and arthritis. Obesity, depressive symptomatology, history of heart attack, and arthritis were positively correlated with longer chair stand times, suggestive of poor performance. Finally, participants with diabetes and depressive symptomatology were more likely to have poor foot tap coordination than those without these respective conditions (Table 3).

ADL and IADL disability

ADL summary scores were significantly higher in younger and older women than in their male counterparts, whereas IADL summary scores were significantly higher for older women only. A greater proportion of younger and older women reported some difficulty in performing ADLs and IADLs compared to men in the same age groups. Interestingly, slightly more young men than young women reported inability to perform ADLs, although these percentages were very small (Table 4). Poor physical function was strongly and significantly associated with self-reported ADL and IADL disability for both younger and older adults (Figure 1).

Discussion

In this cross-sectional study, Puerto Rican women between 60 and 75 years of age exhibited the poorest physical function. This was shown by impaired handgrip strength and poor lower extremity physical function, as determined by a slow walking speed, poor balance, and poor performance in chair stands and foot-tapping coordination. Performance-based measures of physical function were significantly associated with the presence of prevalent health conditions, including obesity (overall and abdominal), type 2 diabetes, depressive symptomatology, and history of heart attack, stroke, or arthritis, independently of sociodemographic and lifestyle factors known to affect physical function. Performance-

based measures of physical function were strongly and significantly correlated with self-reported ADL and IADL disability.

To our knowledge, this is the first study to describe objective performance-based measures of physical function in Puerto Rican older adults. Impairment in the physiological domains of physical function, including strength, balance, mobility, and motor coordination, is an important intermediary component of the disablement process (Nagi, 1976). We measured these domains and found clear evidence of poor physical function, suggestive of frailty in Puerto Rican older adults. Specifically, handgrip strength impairment was shown to be markedly reduced among younger and older women, with strength measures below the recommended 22 kg seen in other populations (Rantanen et al., 2003). Adequate muscle strength translates to reserve capacity needed to perform daily motor tasks such as walking or rising from a chair (Fried et al., 2001). Low levels of handgrip strength have been shown to predict poor physical function and subsequent disability in healthy older adults 45 to 68 years of age 25 years later (Rantanen et al., 1999). In addition, older people with poor lower extremity physical function are more likely to become institutionalized than those with better function (Fried et al., 2001; Guralnik et al., 1994; Guralnik et al., 1995; Guralnik et al., 2000). Recent data from the Health, Aging, and Body Composition Study showed that poor lower extremity function was associated with increased hospitalization and death in a well-functioning nondisabled population of persons aged 70 to 79 years (Cesari et al., 2009). We found high prevalence of poor walking speed in both younger and older women, whereas poor balance and ability to perform chair stands and foot taps were primarily observed in older women compared to men in the same age groups. Mobility disabilities in older adults are considered early markers of the disablement process and predictive of severe disability, institutionalization, and mortality (Guralnik et al., 2000). Studies in middle-aged adults have also shown that mobility difficulties are present at an earlier age (Iezzoni, McCarthy, Davis, & Siebens, 2001; Melzer, Gardener, & Guralnik, 2005). More importantly, these studies have shown that health conditions commonly associated with mobility limitations are similar in both middle age and older groups.

We found that prevalent health conditions in this population represented a significant burden to their physical functioning, independently of sociodemographic and lifestyle factors known to affect functional abilities. This is of significance because acquisition of pathology is an upstream component of the disablement process (Nagi, 1976). Our findings of associations between prevalent health conditions and performance-based measures of physical function support those seen in the Massachusetts Hispanic Elders Study. In that study, self-reported ADL scores were significantly associated with obesity, diabetes, depressive symptomatology, and history of stroke, heart disease, and arthritis in Puerto Rican elders (Tucker et al., 2000). The association of obesity and physical disability has been observed in the general population and in other Hispanic subgroups (Weil et al., 2002). Men 60 to 79 years of age in the upper range of the overweight category were found to be 50% more likely to report mobility disability than normal weight men in these age range and the odds of obese elderly men were two times greater than those with normal weight (Goya Wannamethee, Gerald Shaper, Whincup, & Walker, 2004). This is consistent with reports showing twice the risk of mobility-related disability for men in the highest quintile of body weight or fat mass compared to the lowest quintile (Visser et al., 1998). Given the expected

increase in life expectancy and the steady increase in the prevalence of obesity, interventions aimed at reducing this epidemic are needed to reduce its effect on functional decline and disability. Our finding of lower risk of low handgrip strength with abdominal obesity was unexpected and requires further investigation. It should be noted that this finding was seen when all health conditions were candidates in a forward regression model. In addition to abdominal obesity, depressive symptomatology and history of stroke and arthritis were associated with handgrip strength impairment. However, unlike abdominal obesity, the presence of these factors resulted in an increased risk of handgrip strength impairment.

Arthritis and depressive symptomatology were also associated with impairment and poor lower-extremity physical function in the present study. Self-reported arthritis is highly prevalent among Hispanic and Mexican American elderly and represents a significant cause of disability in this ethnic group (Song et al., 2007). Arthritis affects the musculoskeletal system and the ability to perform tasks expected of an independent person. However, ways to reduce musculoskeletal impairment to improve function due to arthritis remain a challenge. Depressive symptomatology has been reported to predict decline in physical function in community-dwelling older adults (Penninx et al., 1998). Data from the Hispanic Health and Nutrition Examination Survey (NHANES; Vera et al., 1991) and the Massachusetts Hispanic Elders Study (Falcon & Tucker, 2000) underline the high prevalence of depressive symptomatology among Puerto Rican older adults compared to non-Hispanic White older adults. Depressive symptomatology in Puerto Ricans may be associated with health care access (Rodriguez-Galan & Falcon, 2009) as well as with psychosocial distress (Falcon, Todorova, & Tucker, 2009). Finally, history of heart attack and stroke were significantly associated with poor lower extremity physical function. These findings emphasize the need to better understand the multiple pathologies that may lead to impairment and functional decline, and subsequent disability in older adults with an increased burden of health conditions like the Puerto Rican population.

A limitation of this study is its cross-sectional design, which precludes our ability to examine the continuum of the disablement process (Nagi, 1976). However, the observed high prevalence of poor physical function, a component of this process, is of concern particularly in this rapidly growing, under-studied minority population in the United States. A major strength of this study is the inclusion of a large community-dwelling Puerto Rican older adult population for which performance-based measures of physical function were described for the first time. Furthermore, the strong relationships we found between performance-based measures of physical function and self-reported ADL and IADL disability are similar to those reported in other populations of community-dwelling older adults (Jette, Assmann, Rooks, Harris, & Crawford, 1998). These associations suggest that components of the disablement process upstream from overt disability develop as early as in middle age and that reverting poor physical function may contribute to prevention of disability progression.

In conclusion, poor physical function and self-reported ADL and IADL disability were prevalent and highly correlated in this Puerto Rican population of older adults. Younger and older women showed the poorest physical function. Prevalent health conditions (obesity, type 2 diabetes, depressive symptomatology, heart attack, stroke, and arthritis) were

independently associated with poor physical function. Targeted interventions aimed at improving domains of physical function (strength, balance, mobility, and motor coordination) and managing prevalent health conditions are needed to improve physical function and prevent frailty and disability in this high risk population.

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Figure 1.

Partial correlations between measures of physical function and self-reported ADL ($n = 1,118$) and IADL ($n = 1,119$) summary scores are shown by age group (A = 45-59 years and B = 60-75 years of age)

ADL = activities of daily living; IADL = instrumental activities of daily living. Correlations were adjusted for sex, education, poverty level, tertiles of physical activity level from none/little (lowest tertile) to some (highest tertile), smoking status (current, past, never), and current alcohol consumption (moderate, heavy, light/nondrinker). Higher handgrip strength in kg and balance time in second, and lower times in second for all other measures indicate better performance in physical function. *All p values were $<.01$.

Table 1

Participant Characteristics by Sex

Characteristic	Women (n = 956)	Men (n = 401)	p value ^a
Age (in years; %)			.56
45-59	69.9	30.1	
60-75	71.4	28.6	
Education (% eighth grade)			
45-59	39.3	34.8	.22
60-75	65.5	61.0	.33
Below poverty level (%)			
45-59	58.2	49.6	.03
60-75	68.1	52.5	.001
Smoking (%)			
45-59			<.0001
60-75			<.0001
Never			
45-59	48.5	29.4	
60-75	57.2	33.8	
Past			
45-59	25.8	32.3	
60-75	30.0	38.6	
Current			
45-59	25.7	38.3	
60-75	12.8	27.6	
Alcohol consumption (%)			
45-59			<.0001
60-75			<.0001
None/light			
45-59	59.0	48.2	
60-75	75.9	52.5	
Moderate			
45-59	36.7	35.5	
60-75	22.2	36.4	
Heavy			
45-59	4.3	16.3	
60-75	1.9	11.2	
Physical activity tertile (%) ^b			
45-59			.20
60-75			.02
Lowest			
45-59	28.3	25.5	
60-75	46.5	33.3	

Characteristic	Women (n = 956)	Men (n = 401)	p value ^a
Mid			
45-59	33.3	29.5	
60-75	34.0	38.8	
Highest			
45-59	38.4	45.0	
60-75	19.6	27.9	
Health conditions (%)			
Obesity (BMI ≥ 30 kg/m ²)			
45-59	61.7	44.0	<.0001
60-75	62.4	42.5	<.0001
Abdominal obesity (waist circumference > reference) ^c			
45-59	79.7	43.0	<.0001
60-75	84.1	45.6	<.0001
Type 2 diabetes ^d			
45-59	33.9	37.2	.37
60-75	50.7	45.0	.25
Depressive symptomatology ^e			
45-59	67.9	50.0	<.0001
60-75	58.8	43.5	.002
Heart disease ^f			
45-59	11.8	10.4	.55
60-75	16.6	15.0	.64
Heart attack			
45-59	5.3	9.2	.04
60-75	11.8	15.0	.32
Stroke			
45-59	2.4	0.8	.12
60-75	5.5	9.5	.09
Arthritis			
45-59	48.6	27.9	<.0001
60-75	69.2	46.3	<.0001

^aSex differences in participant characteristics by age group were tested using chi-square.

^bTertiles of physical activity level from none/little (lowest tertile) to some (highest tertile).

^cWaist circumference >88 cm for men and >102 cm for women (National Heart, Lung, and Blood Institute, 2001).

^dAmerican Diabetes Association (ADA) guidelines (American Diabetes Association, 2002).

^eCenter for Epidemiologic Studies Depression questionnaire (CES-D; Radloff, 1977). A score ≥ 16 is considered as depressive symptomatology.

^fSelf-report.

Table 2

Physical Function Among Puerto Rican Older Adults by Sex

Variable	Women (n = 956)	Men (n = 401)	p value
Handgrip (kg) ^a			
45-59	20.8 ± 6.1	35.9 ± 8.6	<.0001
60-75	18.5 ± 5.1	31.9 ± 7.8	<.0001
Handgrip strength impairment (kg) ^{a,b}			
45-59	16.9 ± 4.0	30.4 ± 5.9	<.0001
60-75	16.6 ± 4.0	29.2 ± 5.9	<.0001
10-ft walk (sec) ^a			
45-59	7.9 ± 2.4	7.3 ± 2.2	.002
60-75	9.2 ± 2.8	8.3 ± 2.8	.001
Poor walking speed (<0.4 m/s) %			
45-59	42.5	33.8	.02
60-75	66.8	46.8	<.0001
Poor balance (<10 s) %			
45-59	15.8	12.8	.26
60-75	30.9	22.5	.05
Chair stand time (s) ^a			
45-59	14.1 ± 5.4	13.8 ± 5.4	.43
60-75	16.2 ± 5.9	15.0 ± 6.1	.05
Foot tapping (s) ^a			
45-59	9.4 ± 5.6	9.1 ± 6.1	.45
60-75	12.0 ± 6.9	10.3 ± 6.0	.006

Note: Sex differences in physical function and disability variables by age group were tested using *t* test for continuous variables or chi-square for categorical variables.

^a $M \pm SD$.

^b Handgrip strength impairment was defined as strength following in the bottom two tertiles and ascertained separately for men and women. Handgrip strength impairment cutoff values were 37.9 kg for men and <22.5 kg for women. Mean values shown are for those who are impaired.

Table 3

Association of Health Status With Physical Function Among Puerto Rican Older Adults

Health conditions	Low handgrip strength (bottom two tertiles)		Low walking speed (<0.4 m/s)		Poor balance (<10 s)		Chair stand time (s)		Foot-tapping time (s)	
	OR	95% CI	OR	95% CI	OR	95% CI	Beta estimate	SE	Beta estimate	SE
Obesity			1.75****	1.35, 2.28	1.78****	1.28, 2.48	1.53****	0.33		
Abdominal obesity	0.51****	0.37, 0.70								
Type 2 diabetes									1.23****	0.35
Depressive symptomatology	1.46**	1.11, 1.90	1.63****	1.25, 2.13			0.81*	0.33	0.88*	0.35
Heart attack					1.96**	1.23, 3.11	1.84**	0.57		
Stroke	3.61*	1.24, 10.53			4.56****	2.33, 8.92				
Arthritis	1.61***	1.23, 2.10			1.56**	1.13, 2.16	1.29****	0.34		

Note: OR = odds ratio; CI = confidence interval. OR and 95% CI are shown, except for continuous variables of chair stand and foot-tapping coordination for which beta estimates and standard errors are shown. Handgrip strength impairment was defined as strength following in the bottom two tertiles and ascertained separately for men and women. Handgrip strength impairment cutoff values were 37.9 kg for men and <22.5 kg for women. Multivariable binary logistic regression (impairment, mobility disability, and poor balance) or linear regression (chair stand and foot tapping coordination) models adjusted for age group (45-59 vs. 60-75 years), sex, education, poverty level, tertiles of physical activity level from none/little (lowest tertile) to some (highest tertile), smoking status (current, past, never), and current alcohol consumption (moderate, heavy, light/nondrinker), with each health condition entered in a forward stepwise manner if they met the .05 significance level.

*
p < .05.

**
p < .01.

p < .001.

p < .0001.

Table 4**Self-Report Physical Disability Among Puerto Rican Older Adults by Sex**

Variable ^a	Women (n = 951)	Men (n = 398)	p value ^b
ADL level of difficulty (%)			
45-59			<.0001
60-75			<.0001
No difficulty			
45-59	27.4	45.0	
60-75	19.7	33.8	
Some difficulty			
45-59	67.2	49.0	
60-75	66.7	57.8	
A lot of difficulty			
45-59	5.3	5.2	
60-75	13.1	2.7	
Unable to do			
45-59	0.2	0.8	
60-75	0.6	0.7	
ADL summary score ^c			
45-59	3.8 ± 4.6	3.0 ± 5.0	.02
60-75	5.5 ± 5.9	2.9 ± 4.7	<.0001
IADL level of difficulty (%)			
45-59			.006
60-75			<.0001
No difficulty			
45-59	52.0	64.9	
60-75	41.5	64.6	
Some difficulty			
45-59	42.6	29.9	
60-75	46.2	29.9	
A lot of difficulty			
45-59	5.1	4.8	
60-75	10.4	4.1	
Unable to do			
45-59	0.3	0.4	
60-75	1.9	1.4	
IADL summary score ^c			
45-59	1.6 ± 2.5	1.4 ± 2.6	.27
60-75	2.6 ± 3.5	1.3 ± 2.8	<.0001

Note: ADL = activities of daily living; IADL = instrumental activities of daily living.

^aLevel of difficulty (0 = *no difficulty*, 1 = *some difficulty*, 2 = *a lot of difficulty*, and 3 = *unable to do*) to perform 12 ADL and 6 IADL were ascertained. Summary scores represent the sum of the responses on each questionnaire. Best and worst possible summary scores for ADL are 0 and 36, and for IADL 0 and 18, respectively.

^bSex differences in ADL and IADL level of difficulty and summary scores by age group were tested using chi-square for categorical variables and *t* test for continuous variables, respectively.

^c $M \pm SD$.

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