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Correlates of Mobility Limitation in African Americans

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Background. This study identified demographic and health-related characteristics that were related to mobility limitation in a sample of community-dwelling African Americans.

Methods. The sample consisted of 602 community-dwelling African-American men and women ages 48–92 years at study inception. Participants who reported being limited "a lot" or "a little" in climbing one flight of stairs or walking several blocks were considered to have mobility limitation. Logistic regression was conducted to estimate the independent effect of each demographic and health-related characteristic on odds of mobility limitation.

Results. African Americans who reported two or more medical conditions had higher odds of mobility limitation (women: odds ratio = 3.52; 95% confidence interval: 1.89–6.53 and men: odds ratio = 2.53; 95% confidence interval: 1.10–5.85) than those who reported one or fewer medical conditions. African Americans with major depressive symptoms had higher odds of mobility limitation (women: odds ratio = 2.98; 95% confidence interval: 1.55–5.71 and men: odds ratio = 3.19; 95% confidence interval: 1.33–7.65) than those without major depressive symptoms.

Conclusions. These results highlight the importance of creating interventions particularly focused on chronic disease prevention and management for African American men and women during midlife to attempt to delay the onset or impede the progression of mobility problems that will likely become exacerbated in late life and severely affect the quality of life.

Key Words: African Americans—Mobility—Health disparities—Late-life function.

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THE proportion of the U.S. population aged 65 years and older and the number of aged minorities is increasing rapidly (1–3). The impact of this demographic shift on the society as a whole and the health care system in particular will be largely driven by declines in the physical function (particularly mobility) of older adults (4,5). Mobility limitation is typically defined as reported difficulty walking for one-quarter mile or climbing one flight of stairs (6,7), and it is a precursor to mobility disability that has been associated with adverse events in older adults, such as hospitalizations, nursing home admissions, onset of activity of daily living and instrumental activity of daily living disability, and mortality (8–15). Furthermore, mobility limitation is amenable to interventions because it represents an early stage of age-related decline (7,16,17). Thus, efforts to identify factors underlying mobility and its limitations are critical for ameliorating additional mobility loss and subsequent disability.

Maintaining mobility is critical for the independence and quality of life of older adults. Previous work has identified key demographic and health-related characteristics such as smoking, drinking, chronic conditions, physical inactivity, and body mass index that are associated with mobility loss (9,18,19). Although this information has increased our knowledge regarding mobility, less research has examined this association within race groups particularly African Americans. Compared with whites, African Americans engage in more negative health behaviors and have an earlier onset of chronic conditions (20) that may affect mobility. This suggests that there are likely social and/or biological factors embodied in the African American aging experience that must be taken into account. In addition, the attempt to intervene with African Americans without regard for unique circumstances and issues that face this population results in less than effective outcomes (21).

This study will enhance our understanding of the factors associated with mobility using a sample of middle- to old-age African Americans. Instead of focusing on mobility differences between race groups, the current study will focus on differences within a race group that contribute to individual differences in mobility. Understanding within-group

individual differences is an important first step to better understand results from between-group examinations (5,22). Information gained from identifying specific factors that are associated with mobility in African Americans will help us better understand health disparities and prepare for the needs of the rapidly growing population of older African Americans. The objective of this cross sectional study was to determine which demographic and medical conditions were related to mobility limitation.

Method

Study Population

Data are from the Patterns of Cognitive Aging study, which is part of a larger group of aging studies known as the Baltimore Study of Black Aging. The sample consisted of 602 community-dwelling African-American men and women between the ages of 48 and 92 years at study inception. These participants were recruited from 29 senior apartment complexes in the city of Baltimore, Maryland. Data collection lasted 18 months and took place between 2006 and 2008. The interviews lasted 2.5 hours on average and consisted of a face-to-face interview in which there were three blood pressure measurements, three lung function measurements, a battery of cognitive tests, and information collected on physical and mental health. All participants signed a written informed consent agreement approved by the Institutional Review Board at Duke University and received monetary compensation for their participation.

Measures

Mobility limitation.—Mobility was based on participant's report of whether their health currently limits them in being able to walk several blocks or climb one flight of stairs (23). Participants who reported being limited "a lot" or "a little" in climbing one flight of stairs or walking several blocks were considered to have mobility limitation. A binary variable was created to identify those individuals with mobility limitations.

Demographic characteristics.—Demographic characteristics included age, sex, marital status, high-school completion, and income. Age was measured as a continuous variable. Female sex was coded as a dichotomous variable. Marital status and education level were coded as binary variables indicating those who were married and those who graduated from high school, respectively. Self-reported family income was based on participants' selection of 1 of 23 categories ranging from less than $100 to $2300 or more per month in $100 increments.

Medical conditions.—Medical conditions included depressive symptoms, cognitive functioning, and chronic health conditions. Depressive symptoms were assessed using the 20-item Center for Epidemiological Studies-Depression scale (24,25). A binary variable was created to characterize participants who scored 16 and above as having major depressive symptoms (24,25). Cognitive impairment was based on the Mini-Mental State Examination (26). A dichotomous variable was created to describe those participants who scored less than 24 as being cognitively impaired (26). Chronic health conditions were based on participants' report of physician diagnoses of the following: angina, asthma, arthritis, cancer, diabetes, stroke, heart attack, or high blood pressure. Each of the chronic conditions was coded as binary variables (1 = present and 0 = absent). Due to the small number of participants reporting angina or heart attack, a binary variable representing heart trouble was created. All nine conditions were summed to create a variable representing the total number of medical conditions, which was then dichotomized as having two or more conditions compared with one or none.

Statistical Analyses

Student's *t* tests for continuous variables and chi-square tests for categorical variables were used to evaluate the mean and proportional differences by sex for the demographic measures, medical conditions, and mobility limitation. Logistic regression was conducted to estimate the independent effect of each demographic and medical condition on odds of mobility limitation. Because women report greater mobility difficulty and men exhibit better physical performance for a given level of reported functioning (7,27,28), all analyses were stratified by sex. p Values $<.05$ were considered statistically significant, and all tests were two tailed. Analyses were conducted using SAS, version 9.1.3, software (SAS Institute, Inc., Cary, NC).

Results

The distribution of the demographic and medical conditions for the total sample and by sex is shown in Table 1. The average age of the 602 participants was 69.1 ± 9.8 years. The majority of the participants were female, high-school graduates, reported arthritis, hypertension, two or more medical conditions, or mobility limitation; whereas less than half were married, reported major depressive symptoms, cognitive impairment, asthma, cancer, diabetes, stroke, or heart trouble. Also, on average, the monthly family income was between $1,000 and $1,100. Examining the demographic factors by sex revealed that women were older and more likely to be a high-school graduate compared with men. With regard to medical conditions, overall, women exhibited a poorer health profile than men, with higher rates of asthma, arthritis, hypertension, comorbid conditions, and mobility limitations. There were no significant differences between men and women with respect to being married, income level, major depressive symptoms, cognitive impairment, or

Table 1. Demographic and Medical Conditions of Participants in the Patterns of Cognitive Aging Study

Characteristic	Total (N = 602)	Women (N = 449)	Men (N = 152)	p Value
Demographic				
Age (years)	69.1 ± 9.8	69.9 ± 9.8	66.6 ± 9.2	<.001
Female (%)	74.7	—	—	—
Married (%)	11.4	10.3	14.6	.152
High-school graduate (%)	57.2	60.6	47.0	.004
Income	10.3 ± 5.8	10.1 ± 5.5	10.5 ± 6.4	.475
Medical conditions (%)				
Major depressive symptoms	24.1	22.7	28.3	.165
Cognitive impairment	25.1	24.3	27.0	.507
Asthma	18.8	21.0	12.5	.021
Arthritis	65.9	72.4	46.7	<.001
Cancer	10.5	9.4	13.8	.123
Diabetes	34.3	34.9	32.9	.652
Stroke	16.3	15.4	19.1	.289
Hypertension	83.3	86.3	74.3	<.001
Heart trouble	20.0	19.7	21.1	.716
Two or more medical conditions	84.1	85.5	79.6	.085
Mobility limited (%)	62.6	65.9	53.3	.005

Note: Two or more medical conditions included major depressive symptoms, cognitive impairment, asthma, arthritis, cancer, diabetes, stroke, hypertension, and heart trouble.

being diagnosed with cancer, diabetes, stroke, or heart trouble.

The independent associations of the demographic and medical conditions to mobility limitations by sex are shown in Table 2. Comorbid conditions were associated with mobility limitation in African American men and women. African Americans who reported two or more health conditions also had higher odds of mobility limitation (women: odds ratio [OR] = 3.52; 95% confidence interval [CI]: 1.89–6.53 and men: OR = 2.53; 95% CI: 1.10–5.85) than those who reported one or fewer medical conditions. In women, those with higher incomes had lower odds of mobility limitation (OR = 0.94; 95% CI: 0.90–0.98) than those with lower incomes. This relationship was not observed in men.

To determine which medical condition(s) were associated with mobility limitation, the independent effects of each condition are shown by sex in Table 3. In the multivariate adjusted model, women who reported major depressive symptoms (OR = 2.98; 95% CI: 1.55–5.71), arthritis (OR = 2.76; 95% CI: 1.67–4.55), diabetes (OR = 2.14; 95% CI: 1.30–3.53), or heart trouble (OR = 2.36; 95% CI: 1.20–4.62) had higher odds of mobility limitations compared with those who did not report having these medical conditions. Men who reported major depressive symptoms (OR = 3.19; 95% CI: 1.33–7.65) or a stroke (OR = 3.06; 95% CI: 1.06–8.87) had higher odds of mobility limitation than those who did not report having these conditions.

Discussion

The ability to maintain mobility is essential to overall life quality in older adults (9). In this sample of African Americans, the authors sought to identify demographic and medical conditions that are associated with mobility limitation. African Americans who reported two or more medical conditions or major depressive symptoms were found to be associated with mobility limitation. Low-income status was

Table 2. OR and 95% CI Relating Demographic and Comorbid Conditions to Mobility Limitations, Patterns of Cognitive Aging Study

	OR (95% CI)	
Characteristic	Women	Men
Age (years)	1.01 (0.99–1.03)	0.99 (0.95–1.03)
Married	0.84 (0.40–1.77)	1.65 (0.55–4.95)
High school graduate	1.23 (0.76–1.98)	0.67 (0.33–1.36)
Income	0.94 (0.90–0.98)	1.01 (0.94–1.07)
Two or more medical conditions	3.52 (1.89–6.53)	2.53 (1.10–5.85)

Notes: Two or more medical conditions included major depressive symptoms, cognitive impairment, asthma, arthritis, cancer, diabetes, stroke, hypertension, and heart trouble. CI = confidence interval; OR = odds ratio.

Table 3. Association Between Medical Conditions And Mobility Limitation by Sex, Patterns of Cognitive Aging Study

	OR (95% CI)	
Medical Condition	Women	Men
Major depressive symptoms	2.98 (1.55–5.71)	3.19 (1.33–7.65)
Cognitive impairment	0.88 (0.50–1.54)	1.40 (0.61–3.22)
Asthma	1.33 (0.74–2.41)	0.68 (0.21–2.21)
Arthritis	2.76 (1.67–4.55)	1.74 (0.80–3.79)
Cancer	0.69 (0.32–1.49)	1.00 (0.31–3.26)
Diabetes	2.14 (1.30–3.53)	2.33 (0.99–5.50)
Stroke	0.91 (0.47–1.77)	3.06 (1.06–8.87)
Hypertension	0.78 (0.39–1.59)	0.93 (0.38–2.29)
Heart trouble	2.36 (1.20–4.62)	0.80 (0.30–2.10)

Notes: Model adjusted for age, marital status, education, and income. CI = confidence interval; OR = odds ratio.

also found to be associated with mobility limitation among women. Findings suggest that these factors are important to the preservation of mobility in African Americans.

Comorbid conditions were related to mobility limitation such that African Americans with two or more medical conditions had substantially higher odds of mobility limitation than those with one or no medical conditions. This is consistent with previous work (29,30) and now extends to African Americans. In this relatively low-income sample, more than two thirds of the African Americans reported two or more conditions and more than one half reported mobility limitations. This emphasizes the importance of continued vigilance in chronic disease prevention, screening, and management of African Americans particularly among those who have relatively low income.

Although knowing that comorbid conditions are related to mobility limitation has merit, identifying specific medical conditions would greatly enhance the ability to target interventions and prevention particularly in African Americans who have disproportionately more chronic conditions than their white counterparts (1,20). African American women who reported major depressive symptoms had nearly three times the odds of mobility limitation; whereas African American men had just over three times the odds of mobility limitation. Major depressive symptoms have not been previously identified as a factor for mobility difficulty. However, other investigators have demonstrated a link between depression and disability (31–34). These findings suggest that apathy may play a role in this relationship because it is not that people could not do the measured activities but instead were not motivated to do so. Furthermore, it is plausible that high levels of apathy might lead to higher reports of physical limitations because the lack of psychological will or drive could limit an individual's engagement in certain activities. It is also acknowledged that lack of limitations might lead to apathetic affect. Not being able to do basic activities could likely affect mood. Because there was no data collected on apathy, the latter cannot be evaluated. However, the hypothesis that apathy may lead to mobility limitations should be considered in future research where the temporal ordering of the relationship can be established.

Four conditions were identified as being related to mobility limitation and these varied by sex. In women, arthritis, diabetes, and heart trouble were associated with mobility limitation, whereas stroke was related to mobility loss in men. Each of these conditions has been identified by others and has been reported as being associated with poor functional outcomes in mid- and late life (9,35–38). These health conditions occur at early ages and are highly prevalent in African Americans (20). This emphasizes the importance of focusing on prevention and interventions at younger ages in the life course of African Americans that may lead to a decrease in disparities in functional status in late life (39).

Previous work has established a link between income and mobility limitation (9,39,40). Herd and colleagues (41) proposed that income rather than education may serve as a more important resource for health for African Americans. In this study, African American women with higher incomes had lower odds of mobility limitation than those with lower incomes independent of demographic and medical conditions. Because income affects the resources available for management and/or treatment of chronic conditions and the ability to compensate (41–44), it is likely that African American women with lower income may be at higher likelihood of mobility decline. Similar to previous work (9), the association between income and mobility was not observed in men. The reason for this is unclear and warrants attention. These findings indicate the importance of understanding socioeconomic factors and how they relate to mobility problems in middle to old aged African Americans.

There are aspects of the study that warrant comment. This sample was limited to African Americans who reside in senior housing in Baltimore, Maryland. Thus, the external validity of our findings may be limited to this specific sample of African Americans. Mobility limitation was based on self-report that can be influenced by race-related factors such as walking ability, health care access and utilization, and social and cultural norms and expectations regarding the meaning of difficulty (7,45–47). This typically results in an underestimate of the race difference in mobility limitation (7). Whenever possible, both self-report and performance-based measures of mobility should be used. The comorbidity measure was based on the participant's report of being told by a physician whether they had specific conditions. Self-report of disease status has been found to be an accurate indicator of disease status in older adults (9,48). Comorbid conditions were represented by a count of chronic conditions without any information regarding disease severity. Nonetheless, a strong association between comorbid conditions and mobility limitation was observed in our study. Neither disease nor depression severity was obtained in this study but may be important in understanding how either of these manifestations lead to mobility decline. Health behaviors have been associated with mobility limitation (16,19,37); however, health behaviors were not obtained in the sample. Hence, an understanding of how health habits influence mobility in African Americans is needed. The cross-sectional nature of the data does not allow the opportunity to establish temporal relationships between the factors and mobility decline. A longitudinal study with a sufficient number of African Americans that seeks to identify modifiable factors for mobility loss is needed.

Despite the limitations, this study has a number of strengths. The authors are unaware of any other study that has identified factors related to mobility loss in a sample that contains only African Americans. This sample of African Americans ages 48–92 years provides an opportunity to identify factors that are related to mobility loss at a younger age than previous work. Moreover, examining mobility

limitation in a younger sample of African American can potentially reduce the selection bias that is associated with premature mortality of African Americans particularly men (49,50). Furthermore, it is important for scholars who wish to gain a better understanding of disparities in functional outcomes in late life to understand the heterogeneity that occurs in middle age (51). Studies that begin collecting data at 65 years of age and do not ascertain information on early-life exposure are limited in scope to understand the mechanisms that underlie the observed inequalities in functional status. Therefore, a younger sample of African Americans may provide critical information that can alter the progression or trajectory of mobility problems in this understudied population.

This study adds to extant literature on race differences in functional status by identifying factors that are associated with mobility loss in a sample of African Americans with a broader age range (48–92 years of age) than typically studied. In this study, several conditions are related to mobility loss and some vary by sex. Efforts to reduce race disparities in mobility loss among African Americans should focus on decreasing major depressive symptoms in African American men and women; diabetes, arthritis, and heart trouble in women; and stroke in men. Prospective studies can help target the development of interventions to reduce/eliminate disparities in mobility (18), which could considerably enhance the quality of life for middle- to old-age African Americans. This is consistent with the next phase of health disparities research, focusing on an examination of factors that are related to health and functional status for each race group separately (5,42,52).

The rapidly growing U.S. population aged 65 years and older will bring with it greater numbers of minorities and people with mobility challenges. Findings from this within-race examination indicate that comorbid conditions were associated with mobility limitations in African Americans. Gender and socioeconomic level were found to be particularly salient factors in that women with low income were most affected by mobility limitations. These findings suggest that strategies to preserve mobility among African Americans must include efforts to reduce major depressive symptoms and proper health care to treat and control medical conditions, such as diabetes, heart trouble, arthritis, and stroke. The results highlight the importance of creating interventions specifically focused on chronic disease prevention and management for African American men and women during midlife to attempt to delay the onset or impede the progression of mobility problems that will likely become exacerbated in late life and severely affect the quality of life.

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