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## Relationship Between Chronic Conditions and Disability in African American Men and Women

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### Abstract

**Background**—Race differences in chronic conditions and disability are well established; however, little is known about the association between specific chronic conditions and disability in African Americans. This is important because African Americans have higher rates and earlier onset of both chronic conditions and disability than white Americans.

**Methods**—We examined the relationship between chronic conditions and disability in 602 African Americans aged 50 years and older in the Baltimore Study of Black Aging. Disability was measured using self-report of difficulty in activities of daily living (ADL). Medical conditions

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included diagnosed self-reports of asthma, depressive symptoms, arthritis, cancer, diabetes, cardiovascular disease (CVD), stroke, and hypertension.

**Results**—After adjusting for age, high school graduation, income, and marital status, African Americans who reported arthritis (women: odds ratio (OR)=4.87; 95% confidence interval(CI): 2.92–8.12; men: OR=2.93; 95% CI: 1.36–6.30) had higher odds of disability compared to those who did not report having arthritis. Women who reported major depressive symptoms (OR=2.59; 95% CI: 1.43–4.69) or diabetes (OR=1.83; 95% CI: 1.14–2.95) had higher odds of disability than women who did not report having these conditions. Men who reported having CVD (OR=2.77; 95% CI: 1.03–7.41) had higher odds of disability than men who did not report having CVD.

**Conclusions**—These findings demonstrate the importance of chronic conditions in understanding disability in African Americans and how it varies by gender. Also, these findings underscore the importance of developing health promoting strategies focused on chronic disease prevention and management to delay or postpone disability in African Americans.

**Publication Indices**—Pubmed, Pubmed Central, Web of Science database

### Keywords

disability; African Americans; health disparities; chronic; conditions; men

## INTRODUCTION

The segment of the population 65 years of age and older is steadily increasing and becoming more racially diverse.<sup>1,2</sup> The proportion of older African Americans is projected to triple by 2050.<sup>3</sup> This increase is partly attributed to medical advances resulting in people living longer with chronic conditions,<sup>4</sup> yet one of the primary outcomes of chronic conditions among older adults is disability. In addition, disability is strongly associated with adverse health events such as nursing home admission, hospitalization, and mortality.<sup>5–12</sup> The link between chronic conditions and disability has important implications that vary by race, socioeconomic status, or age. African American older adults consistently exhibit a higher prevalence of chronic conditions and disability compared to white older adults.<sup>13–17</sup>

There is a growing body of research that seeks to understand the relationship between specific chronic conditions and disability.<sup>18–24</sup> Although these studies have informed how specific conditions affect disability as well as how these conditions contribute to race- and socioeconomic-related differences in disability, little research is known about the association between chronic conditions and disability among African Americans.<sup>25,26</sup> This is somewhat surprising given the higher rates of disability and chronic conditions in older African Americans compared to older white Americans.

African Americans have higher rates of diseases that can have disabling effects<sup>27</sup> than whites do, as well as less access to high quality health care for those conditions.<sup>28</sup> For example, diabetes, which is more prevalent in African Americans than whites,<sup>29</sup> can lead to diabetic retinopathy. Diabetic retinopathy can lead to vision loss, which leads to further disability.<sup>30–33</sup> Also arthritis is the most commonly reported cause of disability, and the third leading cause of work limitation in the United States.<sup>34–36</sup> African American men have

higher rates of diabetes than African American women.<sup>37</sup> Osteoarthritis in the hand can weaken grip strength, which leads to difficulty in daily functional activities such as opening doors, medication bottles, and food jars.<sup>38</sup> African American women are at the highest risk for developing knee OA and needing joint replacement surgery than African American men, white men, and white women.<sup>39</sup> Stroke is another major cause of disability that often results in paralysis, weakened limbs, altered gait, and speech difficulties.<sup>40</sup> African Americans are more likely to experience disability after a stroke than their white counterparts, and African American men have more strokes than African American women, white men, and white women.<sup>41</sup> The higher prevalence of these potentially disabling diseases among African Americans contributes to a higher African American disability rate compared to whites as well as the fact that these diseases affect African Americans at younger ages than they do whites.<sup>25,26,42-44</sup>

Researchers have also highlighted the disabling effects of chronic conditions in African Americans by conducting within sex group studies. For example, it is well documented that African American women with osteoarthritis are more likely to experience functional limitations and disability than white women with osteoarthritis.<sup>45,46</sup> In addition, researchers have reported that African American women with breast cancer are more likely to be disabled than white women with breast cancer.<sup>47</sup> Among men with chronic pain African Americans had higher rates of disability from chronic pain than whites.<sup>48</sup> Warner and Brown reported that African American women reportedly have higher rates of disability than African American men, white men and white women.<sup>49</sup> However these scholars did not examine the relationship between chronic conditions and disability by sex groups. Further work is needed to understand the relationship between chronic conditions and disability by sex among African Americans.

Despite these striking differences in prevalence and time of onset of chronic disease as well as disability, little is known about the association between specific chronic conditions and disability in African Americans.<sup>18,27,50,51</sup> Researchers need to further examine the relationships that exist between chronic conditions and disability in African Americans, which can support development of strategies needed to promote health, enhance quality of life and decrease disability rates in African Americans living with chronic disabling conditions.<sup>52</sup> Understanding within-group differences is a key step to better understanding between-group differences.<sup>53,54</sup> Furthermore, understanding the within-group variability provides insights on the ways in which factors interact within an adversely affected group and not just the differences between groups.<sup>53,54</sup> Thus the objective of this study is to examine the association between specific chronic conditions and disability in African American older adults.

## METHOD

### Study Population

Data are from the Patterns of Cognitive Aging (PCA) study, which is part of a larger group of aging studies known as the Baltimore Study of Black Aging (BSBA). The sample consisted of 602 community-dwelling African Americans between the ages of 48 and 92 at the beginning of the study. 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

### Disability

The outcome variable for this study is disability. This variable was derived from the participant's report of difficulty in performing basic activities of daily living (ADLs). This included eating, dressing, grooming, walking, bathing, using the toilet, and transferring in and out of bed.<sup>55</sup> The four possible response categories included: never need help (1), have difficulty but can do without help (2), have difficulty and need help (3), and never do the activity (4). A binary variable was created for each ADL to indicate whether the individual had difficulty in performing that specific activity. After summing these seven binary variables, a dichotomous variable for disability was created to identify those individuals who had difficulty in a least one ADL. This approach is similar to the approach of other investigators.<sup>17,25,56</sup>

### Medical Conditions

Medical conditions included depressive symptoms and chronic health conditions. Depressive symptoms were assessed using the 20-item Center for Epidemiological Studies Depression (CES-D) Scale.<sup>57,58</sup> A binary variable was created to characterize participants who scored 16 and above as having major depressive symptom.<sup>57,58</sup> Chronic health conditions were based on participants' report of physician diagnoses of the following: angina, asthma, arthritis, cardiovascular disease (CVD), diabetes, stroke, heart attack, or high blood pressure. Each of the chronic conditions was coded as a binary variable (1=present; 0=absent). Because of the small number of participants reporting angina and heart attack, a binary variable was created to characterize CVD.

### Demographic Characteristics

Demographic characteristics included age, marital status, high school completion, and income. Age was measured as a continuous variable. Marital status and educational 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 one of twenty-three categories ranging from under \$100 to \$2300 or more per month in \$100 dollar increments.

### Statistical Analyses

Student's t-tests for continuous variables and Chi-squared tests for categorical variables were used to evaluate the mean and proportional differences by sex for the demographic measures, medical conditions, and disability. Logistic regression was conducted to estimate

the independent effect of each demographic and medical condition on odds of disability. Because of the documented sex differences in disability<sup>56–58</sup> all analyses were stratified by sex. P-values <0.05 were considered statistically significant and all tests were two-tailed. Analyses were conducted using SAS software, version 9.3 (SAS Institute, Inc., Cary, North Carolina).

## RESULTS

The distribution of the demographic and medical conditions by sex is shown in Table 1. African American men were younger and less likely to be high school graduates than African American women. African American men were less likely to report being diagnosed with asthma, arthritis, or hypertension than African American women. African American men were also less likely to report being disabled than African American women. No differences between men and women were observed for marital status, income, major depressive symptoms, or reports of physician diagnosis of diabetes, stroke, or CVD.

The prevalence of chronic conditions among individuals with disability by sex is shown in Table 2. African American men were less likely to have asthma (10.5% vs. 26.1%;  $p=0.004$ ) or arthritis (60.5% vs. 84.7%;  $p<0.001$ ) compared to African American women. However, African American men were equally likely to have major depressive symptoms, diabetes, stroke, hypertension, or CVD.

The association between disability and chronic conditions by sex is shown in Table 3. After adjusting for age, high school graduation, income, and marital status, African Americans who reported arthritis (women: odds ratio (OR)=4.87; 95% confidence interval(CI): 2.92–8.12; men: OR=2.93; 95% CI: 1.36–6.30) had a higher odds of disability compared to those who did not report having arthritis. Women who reported major depressive symptoms (OR=2.59; 95% CI: 1.43–4.69) or diabetes (OR=1.83; 95% CI: 1.14–2.95) had a higher odds of disability than women who did not report having these conditions. Men who reported having CVD (OR=2.77; 95% CI: 1.03–7.41) had a higher odds of disability than men who did not report having CVD.

## DISCUSSION

Understanding the relationship between chronic conditions and disability is essential for advancing our knowledge of both normal and pathological aging for the growing population of older African Americans. In this study we sought to examine the association between chronic conditions and disability in a sample of older African Americans. Disability is clearly complicated by the presence of chronic conditions and the association between chronic conditions and disability differs by gender. In this study of older African Americans, the health conditions that were associated with disability included arthritis for men and women, major depressive symptoms and, diabetes for women, and CVD for men. African Americans who reported arthritis had a greater odds of disability compared to those who did not report arthritis. African American women with major depressive symptoms or diabetes had a greater odds of disability than those who without these conditions. African American men with CVD had a greater odds of disability than those who without CVD.

These findings underscore the importance of developing health promoting strategies focused on chronic disease prevention and management to delay the onset or progression of disability in African Americans.

The finding that arthritis is associated with greater odds of disability is consistent with previous work<sup>20,22,59–63</sup> and now extends to a sample of older African Americans. The prevalence of arthritis among older African American adults is a public health concern that varies by gender.<sup>64</sup> Furthermore, prior work has demonstrated the deleterious effects of arthritis. For example, arthritis accounts for approximately one-third of disability and about one-tenth of days of restricted activity and it accounted for dependency in mobility and household tasks.<sup>20,61–63</sup> In our study, the prevalence of arthritis was greater among women (84.7%) than men (60.5%). However it is worth noting that the prevalence for both African American men and women is high. Health promoting strategies and interventions to manage and delay arthritis are needed.

This study also provides evidence that the association between chronic conditions and disability varied by gender in people with depression. Women with major depressive symptoms had greater odds of disability than women without these conditions. These findings are consistent with previous research examining the association between depression and disability.<sup>62,63,65–68</sup> They suggest that reports of disability may be dependent on mental health status. It may be that the pattern of reporting is influenced or that a directional pathway occurs wherein disability and the reductions in quality of life lead to depressive states of being. One of the key features of this relationship may be the apathy experienced by those with depression. Understanding the role of apathy in this relationship might highlight whether people were not motivated to do the measured activities rather than not able to do the activities. 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 physical limitations might lead to apathetic affect. Not being able to do basic activities could likely affect mood. Because no data were collected on apathy, the latter cannot be evaluated. Testing hypotheses about direction of effects and the role that apathy may play in mobility limitations should be considered in future research where the temporal ordering of the relationship can be established.

Although others investigators<sup>62,63,69</sup> have documented the relationship between diabetes and disability, those studies did not focus on older African Americans. In our study women with diabetes also had greater odds of disability than women without diabetes. This finding has significant public health implications because older African American women have higher rates of disability<sup>15,70–73</sup> and mobility loss.<sup>25,74</sup> Also older African American women are more likely to be obese; a condition that is linked to diabetes.<sup>75</sup> Diabetes can impact disability through a number of mechanisms including decreased cardiopulmonary reserve, limited mobility, inflammatory processes, decreased muscle strength and quality and accelerate muscle mass loss.<sup>69</sup> These findings underscore the importance of understanding the relationship between diabetes management and disability among African American women. Further understanding about the relationship between diabetes management and

disability may lead to delays in disability and better health outcomes in older African American women.

Men who reported CVD had higher odds of disability than those who did not report CVD in our study. CVD has been associated with disability in past research,<sup>19–22,76</sup> but few have focused on older African American men. This is in part because of a survival bias whereby African American men either do not participate in the study or die from CVD before disability manifests. Findings from this study add to the large literature that suggests CVD should be effectively managed and treated to improve and reduce the disability among older African American men. Future work should also examine how CVD and CVD risk factors influence the onset of disability and mobility in African American men. Scholars should consider examining disability in younger African American men to potentially reduce the selection bias that is associated with premature mortality.<sup>77,78</sup>

In this study, African American women, but not men, with depression and diabetes reported higher odds of disability than those without depression or diabetes. African American men, but not women, with CVD reported higher odds of disability than those without CVD. Examining a sample of only older African Americans shows that there are gendered differences in the way that chronic disease leads to disability. The gendered effects of chronic disease have been examined before, but little has been done exclusively in African Americans. A study of older African Americans found that 50 percent of the women (n=957) reported difficulty with physical function, but only 30 percent of the men (n=649). While arthritis was associated with poor function in men and women, heart disease was associated with poor function only in men.<sup>79</sup> Furthermore, in a study where researchers examined risk factors of disability and gender disparities among adults (n=1,348) over the age of 60, they identified that women reported osteoarthritis and osteoporosis more often than men (p<.001), and women were more likely to be disabled than the men (p<.001).<sup>80</sup> More research is needed in order to understand the causes and potential points of intervention of these gendered differences, particularly in African Americans.

Aspects of the study warrant comment. Because this sample was limited to African Americans who reside in Baltimore, Maryland, the external validity of our findings may be limited to this specific sample of African Americans. While this work was based on self-report data, previous research has documented the excellent accuracy of self-report disability and chronic conditions in older adults.<sup>6,81–83</sup> The current analysis does not include cognitive status which would provide an important covariate to understanding physical disability. Lastly, the data is cross sectional, so there is no opportunity to establish temporal relationships between the specific chronic conditions and disability. A longitudinal study with a sufficient number of older African Americans that seeks to understand how specific chronic conditions affect the natural history of disability is needed.

Nevertheless, this study has strengths as well. The authors are unaware of any other study that has examined the relationship between specific chronic condition and disability in a sample that contains only older African Americans. It is important for scholars who wish to gain a better understanding of disparities in disability in later life to understand the heterogeneity that occurs in earlier in the life course.<sup>46,74,84</sup> Because the participants in this

study were age 50 and above, it provided an opportunity to understand the relationship between chronic conditions and disability in a sample of older African Americans. This somewhat avoids the bias of premature mortality which occurs more often among African American men. Understanding the relationship between chronic conditions and disability only among African Americans provides critical information that can inform strategies to reduce disparities in disability.

Health disparities in chronic conditions are well established in African Americans. Often chronic conditions are not discussed relative to age but rather more simply as the presence or absence of disease. However, the likelihood of experiencing a chronic condition increases with age and is further complicated by other chronic conditions that have their own set of related symptoms and complications that increase with age. The implications of the findings presented here for medical care and public health are that primary care providers should assess not just for clinical diagnoses but also for limitations in key tasks such as mobility, activities of daily living and instrumental activities of daily living related to those diagnoses. Preventing further complication of the conditions should limit the personal suffering, the cost, and the public health impact of these very common diseases among older adults. As the proportion of older adults increases in the U.S. population, it will be even more important to recognize and prevent sequelae from arthritis, major depressive symptoms, diabetes and CVD.

In summary, attempts to reduce race disparities in disability among African Americans could benefit from focusing on decreasing arthritis in African American men and women; major depressive symptoms and diabetes in women; and CVD in men. Prospective studies can help target the development of interventions to reduce/eliminate disparities in disability<sup>72</sup> 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.  
26,50,85

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**Table 1**

## Demographic and Medical Conditions of Participants in the Patterns of Cognitive Aging Study

Characteristic	Women (N = 449)	Men (N = 152)	p-value
Demographic			
Age (years), mean±SD	69.9±9.8	66.6±9.2	<0.001
Married (%)	10.3	14.6	0.152
High school graduate (%)	60.6	47.0	0.004
Family Income, mean±SD	10.1 ±5.5	10.6±6.4	0.475
Medical conditions (%)			
Major depressive symptoms	22.7	28.3	0.165
Asthma	21.0	12.5	0.021
Arthritis	72.4	46.7	<0.001
Diabetes	34.9	32.9	0.652
Stroke	15.4	19.1	0.289
Hypertension	86.3	74.3	<0.001
Cardiovascular disease	26.6	26.3	0.947
ADL disability (%)	59.2	50.0	0.048

Note: SD=standard deviation. Self-reported family income was based on participants' selection of one of twenty-three categories ranging from under \$100 to \$2300 or more per month in \$100 dollar increments.

**Table 2**

Prevalence of Chronic Conditions Among Individuals with Disability in the Patterns of Cognitive Aging Study

<b>Chronic Conditions</b>	<b>Women (n=264)</b>	<b>Men (n=76)</b>	<b>p-value</b>
Major depressive symptoms	29.9	36.8	0.253
Asthma	26.1	10.5	0.004
Arthritis	84.7	60.5	<0.001
Diabetes	40.8	43.4	0.680
Stroke	17.1	23.7	0.189
Hypertension	88.6	82.9	0.189
Cardiovascular disease	30.1	35.5	0.371

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**Table 3**

Association between Disability and Chronic Conditions by Sex in the Patterns of Cognitive Aging Study

Chronic Conditions	Odds ratio (95% Confidence interval)	
	Women	Men
Age	1.00 (0.98,1.03)	1.01 (0.97,1.06)
High school graduate	1.41 (0.86,2.30)	0.74 (0.31,1.75)
Income	0.94 (0.90,0.98)	1.01 (0.93,1.09)
Married	1.90 (0.84,4.28)	0.54 (0.16,1.79)
Major Depressive Symptoms	2.59 (1.43,4.69)	1.84 (0.74,4.58)
Asthma	1.75 (0.98,3.10)	0.48 (0.14,1.68)
Diabetes	1.83 (1.14,2.94)	2.36 (0.99,5.61)
Cardiovascular disease	1.11 (0.66,1.87)	2.76 (1.03,7.40)
Hypertension	1.16 (0.59,2.28)	1.33 (0.53,3.33)
Arthritis	4.86 (2.91,8.12)	3.11 (1.41,6.84)
Stroke	1.05 (0.56,1.96)	1.49 (0.53,4.16)

Note: OR = odds ratio; 95% CI = 95% confidence interval.

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