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The association of pain, race and slow gait speed in older adults

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Abstract

Gait speed is an important indicator of mobility and quality of life in older adults. Pain is related to gait speed; however, it is unknown if this relationship varies by race in a population based national sample. The aim of this study was to examine if the association between slow gait speed and pain differed between 7,025 older African Americans and non Hispanic Whites in the National Health and Aging Trends Study. Those with pain in the last month had higher odds of slow gait speed (odds ratio = 1.38, 95% confidence interval = 1.10 – 1.73) than those without pain. The relationship between pain and slow gait speed did not vary by race (interaction $p = 0.6$). This is important because it points to the underlying racial disparities in pain and gait speed being factors such as disparate opportunities and living conditions, and healthcare rather than attributes intrinsic to race.

Keywords

Race; Pain; Gait Speed; Older Adults

Introduction

Gait speed is an important indicator of mobility among older adults and slow gait speed is related to increased risk of debilitating diseases, longer hospital stays, cognitive decline, and premature mortality.^{1–3} It is well documented that older African Americans often have slower gait speed or experience a faster decline over time in gait speed than non-Hispanic Whites, which may make them particularly vulnerable to the poor health outcomes related to slow gait speed.⁴ Identifying factors that may be particularly related to slow gait speed in this group may address this disparity in older African Americans. Known factors that are related to gait speed are age, education, dementia, and sex.^{5–7} It is also well documented that there is a relationship between pain and gait speed; however, it is not known if this

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relationship differs in older African Americans versus older non-Hispanic Whites.⁸⁻¹⁰ Understanding if pain is associated with slow gait speed more so among older African Americans than non-Hispanic Whites may help highlight pain as a factor that can be addressed to improve gait speed in this group.

Although researchers have identified that African Americans have higher rates of slow gait speed and undermanaged pain than older non-Hispanic Whites, there is a dearth of literature on racial differences in the relationship between pain and gait speed between the two groups. In one study, researchers reported that larger proportions of African Americans had slow gait speeds and were unable to complete gait speed tests than non-Hispanic Whites.¹¹ Researchers have also reported that ethnic minorities had slower gait speed than non-Hispanic Whites among cardiovascular patients ages 65 and older.² Furthermore, in a study of older men with HIV, gait speed declined faster in non-White men than White men.¹² Thorpe and colleagues reported that, in a well physically functioning group, African Americans had slower rates of walking speed at baseline than non-Hispanic Whites; however, the rate of decline thereafter was similar. The relationships between pain, gait speed and racial differences was not reported in any of these studies.¹³

According to the disablement process model, functional limitations are preceded by impairment and this relationship and certain risk factors are related to this relationship.¹⁴ Pain can be thought of as an impairment that can lead to functional limitations; one example of functional limitations is slow gait speed.^{14,15} Non-White race is a risk factor for functional limitations among older adults and may be a risk factor that is related to the relationship between pain and gait speed.^{16,17} Race can be thought of as a social construct; hence life experiences can lead to pain and may differently constrain gait speed based on race.^{18,19} African Americans have a unique pain experience in that they are more likely to have poor outcomes related to pain and are more likely to experience under treatment for pain than non-Hispanic Whites.^{20,21}

Using the disablement process model as the theoretical lens, the aim of this study was to examine if the cross-sectional relationship between slow gait speed and pain differed between older African Americans and non-Hispanic Whites among 7,025 community dwelling older adults in the National Health and Aging Trends Study. We hypothesized that the relationship between pain and gait speed would be stronger in African Americans than in non-Hispanic Whites in this study. This work may highlight an important modifiable factor that can be addressed by clinicians and nurse researchers in improving gait speed and overall health among older African Americans.

Methods

Design

This study had a cross sectional design and was a secondary analysis from the National Health and Aging Trends Study (NHATS). The National Health and Aging Trends Study (NHATS) is a nationally representative sample of Medicare beneficiaries aged 65 years and older. Since study inception in 2011, NHATS has conducted annual face-to-face interviews to collect information regarding their participants' economic well-being, quality of life,

medical conditions, and functional status. Persons at oldest ages and those self-identified as Black/African American are oversampled. Additional information regarding the design features of NHATS are described in detail elsewhere.²² The NHATS study was granted a HIPAA waiver by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB). This waiver grants permission for others to conduct secondary analyses from the NHATS study for public health purposes and for research that has been approved by an IRB under the HIPAA privacy rule.

Sample

Persons at older age groups and those self-identified as Black/African American were oversampled. Additional information regarding the design features of NHATS are described in detail elsewhere.²² Baseline data consisted of a response rate of 71% and included 8,245 participants. The analytic sample for this study included the 7,025 community-dwelling older adults.

Measures

The dependent variable for this study was slow gait speed. As previously measured,²³ gait speed was calculated for each respondent using distance in meters and time in seconds. Gait speed was measured by having the respondents walk their usual pace over a 3-meter course from a standing start. Respondents were allowed to use assistive devices if needed, and the walk was completed two times. The faster of the two times were used for the analyses. Gait Scores 1.0 m/s or below were defined as slow gait speed. This method of measuring and categorizing slow gait speed is consistent within the literature.^{1,23} Each of the respondents from the community based sample of NHATS completed the gait speed test.

The independent variable for this study was pain. Pain in the past month was assessed by the participants' response to the following question, "In the last month, have you been bothered by pain?" (yes/no). A binary variable was created to identify those who reported they had been bothered by pain in the last month.

Covariates

We adjusted for these covariates because they may confound the relationship between pain and gait speed given their relationship with gait speed.⁵⁻⁸ The demographic variables selected for the study were race (1 = non-Hispanic African American, 0 = non-Hispanic White), age (0 = 65-74, 1 = 75-84, 2 = 85+), education (1 = less than high school, 1 = graduated high school, and 2 = beyond high school), sex (male=1, female=0), and marital status (0 = unmarried, 1 = married). We also accounted for cognitive status (1 = probable dementia, 2 = possible dementia, 3 = no dementia). Comorbidities were also measured (e.g. heart attack, high blood pressure, arthritis, osteoporosis, diabetes, lung disease, stroke, and obesity). Research participants self-reported if they had been diagnosed with each of these conditions by a health care provider by responding with either a yes or no. The affirmative responses were summed together to create the number of comorbidities. We then categorized the number of comorbidities as follows: (0 = none, 1 = only 1, 2 = only 2, 3 = 3 or more).²⁴

Data analysis

Sample characteristics were summarized for the entire sample, and compared those who experienced pain in the past month to those who did not using chi-square statistics. A multivariable logistic regression was used to determine the association between slow gait speed and pain in the past month, controlling for race, age, education, sex, being married, dementia status, and number of comorbidities. A multivariable model was conducted like the one described above but included the race by pain interaction term. All of the analyses incorporated analytic survey weights and design factors to account for the complex sampling design of NHATS (with 95% CI).²⁵ The analyses were performed using STATA version 13 (StataCorp LP, College Station, TX). P values less than 0.05 were considered significant.

Results

Sample characteristics

The distribution of the select characteristics of the total sample and by those who experienced pain in the past month is displayed in Table 1. Of the 7,025 older adults, about 52.9% reported that they experienced pain in the past month, and 14% had a slow gait speed. More than half of the older adults were between the ages 65–74, had more than a high school education, and were females. About 90.9% (n = 6,386) of the sample was non-Hispanic White and 9% (n = 639) was Black. A total of 52.6% of non-Hispanic Whites experienced bothersome pain in the last month and 55.8% of non-Hispanic Blacks reported bothersome pain in the last month. A majority of the sample had 3 or more comorbidities (44.8%). The relationship between these variables was compared between those who experienced pain in the past month to those who had not experienced pain in the past month. Older adults who experienced pain in the past month had a slower gait speed, less than a high school education, were more likely to be female, and had 3 or more chronic conditions compared to those who did not experience pain in the past month. No differences were observed between older adults who experienced pain in the past month with regard to age, race/ethnicity, and dementia status compared to those who did not experience pain in the past month.

Outcomes

The association between slow gait and pain in the past month among older adults is reported in Table 2 controlling for age, education, sex, race/ethnicity, dementia status, and number of comorbidities. Older adults who experienced pain in the past month were at a 1.38 higher odds of having a slow gait (95% confidence interval: 1.11–1.73) compared to those who did not have pain in the past month. The relationship between pain and slow gait speed did not vary by race (interaction $p = 0.60$). The results of this interaction are not shown in Table 2.

Discussion

In this study we confirmed the relationship between pain and slow gait speed and found that it does not differ by race after controlling for variables associated with gait speed. This is important because it shows that the disparities in pain relate to disparities in gait speed and are not intrinsically related to race but to life circumstances and increased morbidity. It may

be that when older adults experience both pain and slow gait speed,⁸ there is a relationship between the two irrespective of race. The findings may support that race is expressed in both worse pain and slower gait speed due to experiencing disparate opportunities, living conditions, and healthcare that is expressed in more comorbidities. Furthermore, individuals may have different responses to pain such as resilience and/or beliefs about pain that may affect how they respond to pain stimulus irrespective of race.^{26,27} Individuals may experience similar chronic pain but their physical responses to the pain may differ based on how they perceive their pain or even how long they have lived with the pain.

To our knowledge this is the first study that examined differences in older African Americans and non-Hispanic Whites in the relationship between pain and gait speed, although previous studies have identified race differences in gait speed.^{2,11} Future studies can identify if the relationship varies based on type of pain or length of time living with pain. Longitudinal studies are also needed that look at pain and gait speed and possible race differences. Future research can also look at resilience to pain in both groups and how it may relate to this relationship between pain and gait speed. In spite of there being no difference between races in the relationship between pain and gait speed, it is important to remember that as African Americans experience higher rates of both pain and slow gait speed,^{8,28} that interventions to address both should be considered.

In our study and similar to previous studies^{8,29,30} we observed that gait speed is related to pain. Improving pain management in older adults may help improve gait speed. Prioritizing pain management that targets generalized and multiple types of pain may lead to better gait speed in older adults, ultimately resulting in better physical functioning and health. Both pharmacological and non-pharmacological pain management strategies should be explored.³¹ Additionally, subjective and objective assessments can look at both pain and gait speed. For example, geriatric nurses can monitor older adults for unrelieved pain as a risk factor for having slow gait speed. Furthermore, nurses can look at slow gait speed as a marker for undertreated pain. These findings can signal nurses to discuss pain self-management. Assessing gait speed in older adults in a clinical or community setting is safe, inexpensive and easy to assess.³² Gait speed also serves as an alternative to more subjective measures of assessing low extremity function in older adults.² If nurses can conduct gait speed trajectories among older adults with pain, these findings would identify potential functional outcomes and at risk older adults.^{32,33}

While the pain question in this study focuses on bothersome pain in the last month, it is a commonly used subjective assessment of pain among older adults by clinicians and does capture a snapshot of their pain.³⁴ Nevertheless, there are two strengths to this study. The large, nationally representative sample of Medicare beneficiaries provided the ability to examine whether the relationship between gait speed and pain varied by race. In addition, the available of multiple covariates afforded us the opportunity to account for key potential confounders including socioeconomic status and comorbidities.

In this study we concluded that there is a relationship between pain and gait speed among older adults in general; however, we did not detect a racial difference. Further work is needed to understand how pain medications, medications for chronic disease management,

and different types of pain may be related to gait speed in older adults. In addition, nurse researchers can conduct longitudinal studies targeted toward understanding related factors to gait speed in older adults in order to determine a more objective health risk profile of older adults. Adequately treating pain in older adults may lead practicing nurses and nurse researchers to an avenue for improving gait speed among older adults. An improvement in gait speed may be related to improved quality of life and decreased risk of mortality.

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Table 1

Distribution of Weighted Select Characteristics of Older Adults in the National Health and Trends Study for the Full Sample and by Experiencing Pain in the Past Month (N = 7, 025).

Characteristics	Total	Pain in the Past Month	
		Yes	No
Pain in the month, (%)		52.9	47.2
Slow Gait [†] , (%)			
Yes	14.3	53.4	46.6*
No	85.7	39.7	60.3
Age categories, (%)			
65–74	52.5	52.2	47.8
75–84	33.9	52.9	47.1
85+	13.7	55.2	44.8
Education, (%)			
Less than High School	18.4	57.9	42.1*
High School Graduate	28.8	53.9	46.1
More than HS	52.8	50.6	49.4
Sex, (%)			
Female	56.8	57.3	42.6*
Male	43.2	47.1	52.9
Race/Ethnicity, (%)			
Non-Hispanic White	90.9	52.6	47.4
Non-Hispanic Black	9.10	55.8	44.2
Dementia Status, (%)			
Probable	9.06	57.5	42.5
Possible	9.89	54.0	46.0
No Dementia	81.1	52.2	47.8
Number of Comorbidities, (%)			
None	10.4	26.0	74.0*
Only 1	19.5	37.3	62.7
Only 2	25.2	49.9	50.1
3 or more	44.8	67.5	32.5

* p-value < 0.05.

[†] Walking gait defined as gait speed 1.0 meters/seconds or below.

Table 2

Weighted logistic regression depicting the association between slow gait* and pain in the past month among older adults in the national health and aging trends study

Characteristics	ORR	CI
Pain in the month, (%)	1.38	(1.11–1.73)
Age categories, (%)		
65–74	1.00	
75–84	2.48	(2.00–3.06)
85 +	7.44	(4.54–12.20)
Education, (%)		
Less than High School	1.00	
High School Graduate	1.01	(0.66–1.53)
More than HS	0.49	(0.36–0.66)
Sex, (%)		
Female	1.00	
Male	0.73	(0.59–0.91)
Race/Ethnicity, (%)		
Non-Hispanic White	1.00	
Non-Hispanic Black	2.33	(1.58–3.43)
Dementia Status, (%)		
Probable	1.00	
Possible	0.27	(0.11–0.66)
No Dementia	0.26	(0.12–0.53)
Number of Comorbidities, (%)		
None	1.00	
Only 1	1.11	(0.81–1.53)
Only 2	1.54	(1.12–2.11)
3 or more	2.18	(1.48–3.20)

ORR- Odds ratio, CI- confidence interval.

* Walking gait defined as gait speed 1.0 meters/seconds or below.