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Research Article

The Roles of Body Composition and Specific Strength in the Relationship Between Race and Physical Performance in Older Adults

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Abstract

Background: Socioeconomics may explain black–white differences in physical performance; few studies examine racial differences among socioeconomically similar groups. Performance is also affected by body composition and specific strength, which differ by race. We assessed whether racial differences in physical performance exist among older adults with high education and similar income and whether body composition and specific strength attenuate observed differences.

Methods: Cross-sectional analysis of 536 men (18% black) and 576 women (28% black) aged more than 60 years from the Baltimore Longitudinal Study of Aging. Body composition was evaluated using dual-energy x-ray absorptiometry. Specific strength was assessed by quadricep peak torque divided by height-normalized thigh cross-sectional area and grip strength divided by body mass index-normalized appendicular lean mass. Physical performance was assessed using usual gait speed and fast 400 m walk time. Sex-stratified linear regression models, adjusted for age, height, education, and recent income, determined whether body composition or specific strength attenuated associations between race and physical performance.

Results: Blacks were younger, with higher weight and appendicular lean mass. Black women had higher percent fat and specific strength. In both sexes, blacks had poorer physical performance after adjustment for socioeconomic factors. In women, neither body composition nor specific strength altered the association with gait speed. In men, neither body composition nor specific strength attenuated racial differences in either performance measure.

Conclusions: Poorer physical performance among black compared to white older adults persists among persons with high education and similar income and cannot generally be attributed to differences in body composition or specific strength.

Keywords: Health disparities, Minority aging, Physical function, Gait, Minority health

Black older adults in the United States consistently exhibit poorer physical performance than white older adults (1–8). These differences have frequently been attributed to higher rates of poverty and/or low educational attainment in black study participants (3,5–7). Rarely have racial differences in physical performance been examined in samples with high levels of educational attainment and low to no poverty. In the Baltimore Longitudinal Study of Aging (BLSA), a cohort study of normative aging, black and white participants are highly educated with similar, non-impoverished income levels, offering a unique opportunity to assess racial differences in performance in the absence of socioeconomic burden.

Racial differences in body composition have also been observed in older adults (9–12). Older black men and women generally have higher weight, lean mass, fat mass, and body mass index (BMI) than older white men and women (9–12). Although several studies have found lean mass positively associated with physical performance, the association is equivocal as Manini and Clark (13) in a systematic review found no overall significant association between lean mass and physical performance outcomes. Higher weight, fat mass, and BMI are associated with poorer performance (14–16). Given the known racial differences in body composition and the association between several body composition measures and performance, body composition could be associated with observed associations between race and performance. In addition, although older black adults have greater strength than older white adults, older black adults have been found to have lower specific strength, reflecting a lower amount of strength relative to lean body mass (17,18). Specific strength is positively associated with performance; therefore, racial differences in specific strength may also modify the association between race and performance (19,20).

This study assessed if racial differences in physical performance exist among persons with similarly low economic burden and high education. In addition, we examined whether any observed differences in physical performance were associated with body composition or specific strength. Despite socioeconomic similarities between black and white BLSA participants, we predicted that racial differences in physical performance would persist, but that body composition and specific strength would decrease the association between race and performance. Specifically, we predicted that adjusting for body composition and specific strength would decrease the magnitude of the effect of race on physical performance, indicating a potential underlying mechanism of body composition and specific strength for racial differences in physical performance.

Methods

The BLSA, an observational study, enrolls healthy adults aged 20 years and older. Participants aged 60–79 are seen every 2 years, whereas participants aged 80 years and older are seen annually. All enrolled participants gave informed consent and the study protocol is institutional review board approved. Further details on the BLSA study have been reported previously (21).

This cross-sectional study assessed data from the most recent clinic visit of BLSA participants aged 60 years and older in which all core analytical variables were available. Participants were excluded from the analytic sample if they were missing usual gait speed or if their data were collected from a home visit. The total analytic sample included 536 men and 576 women (18% and 28% black, respectively). Of the total analytic sample, 17% men and 18% women met test exclusion criteria or were unable to complete the 400 m walk; thus, the sample for fast 400 m walk performance consisted of 447 men and 476 women. The measures for specific strength defined by quadricep peak torque and height adjusted thigh cross-sectional area were available for 37% men (200) and 34% women (195) from the total analytic sample.

Physical Performance

We evaluated physical performance via two objective measures: usual gait speed and fast 400 m walk. Usual gait speed (m/s) was calculated as time to walk 6 m at one's usual walking pace. The fastest of two trials was used for the analyses. The 400 m walk, a measurement of endurance walk performance, occurred on a 20 m course where participants were asked to first walk 2.5 minutes at their usual pace and then immediately walk 400 m as quickly as possible. The test was measured as seconds needed to complete the 400 m walk. Only participants able to complete the 400 m walk were included in the fast 400 m walk analysis.

Body Composition

Body composition was assessed via whole-body dual-energy x-ray absorptiometry scans using a Prodigy scanner and software. Measures assessed included appendicular lean mass (ALM; kg) and percent fat mass. ALM is the sum of lean mass from the left and right arms and legs, excluding bone mineral content. Percent fat mass was calculated as the total body fat mass divided by total body weight. In addition, total body weight (kg) was measured on a scale. BMI was calculated as measured total body weight divided by measured height squared (kg/m^2). These body composition measures have been used in the BLSA and many other studies and are associated with physical performance (22–25). A study that assessed intraobserver reproducibility of dual-energy x-ray absorptiometry in younger adults reported high reproducibility for lean mass and fat mass measures (Intraclass correlation (ICC) > 0.992; (26)).

Specific Strength

Specific strength is frequently defined as a ratio of strength to lean mass. For this analysis, we used two measures of specific strength, quadricep peak torque at 30°/s divided by thigh cross-sectional area normalized by height squared (Quad30/TCSAht^2) and grip strength divided by ALM adjusted for BMI (Grip/ALMBMI) (27). Quadricep peak torque was measured as the maximum of three trials of concentric knee extension strength at an angular velocity of 30°/s using the Kin-Com isokinetic dynamometer (Kin-Com model 125E, version 3.2, Chattanooga Group, Chattanooga, TN) until February 2011. Subsequent measurement used the Biodex dynamometer (Biodex Medical System, Advantage Software V.3X, Inc., Shirley, NY). TCSA, acquired from computed tomography scans, was normalized by dividing by height squared. Although Quad30/TCSAht^2 is a measure that uses lower extremity strength and a direct measure of muscle cross-sectional area, more than 60% of men and women in the BLSA were missing this measure of specific strength.

The second measure, Grip/ALMBMI, is an alternate measure of specific strength, reflecting body composition adjusted muscle strength. Grip/ALMBMI was previously validated in the BLSA against Quad30/TCSAht^2. Owing to the positive association between body size and lean mass, ALM was normalized by dividing by BMI. Grip strength (kg) was measured via a Jamar hydraulic hand dynamometer (Patterson Medical, Warrenville, IL). The maximum of three trials for either hand was used.

Covariates

We additionally assessed several covariates: age, education, income (less than or equal to $50,000 vs greater than $50,000), height, weight, and BMI as described previously. Education was classified continuously in years as well as categorically (less than high school, high school, some college, college graduate, and post-college).

Statistical Analyses

All analyses were sex-stratified due to known sex differences in physical performance and body composition (9,14,16,28,29). The *t*-test assessed differences in means by race, and the chi-square test assessed differences in frequencies by race. As a sensitivity analysis, we also compared the sex-specific means and frequencies of sample characteristics for participants who did not complete or were excluded from the 400 m walk to those who completed the 400 m walk, as well as those who did not complete or were excluded from completing the measures for Quad30/TCSAht^2.

Linear regression models by sex assessed if race was associated with physical performance, as well as the impact of body composition and specific strength on any observed differences. Specifically, model 1 examined the association between race and physical performance adjusting for age and height. Height was included as a covariate due to observed positive associations between height and physical performance and height and black race; height was excluded from the models that included specific strength, as the muscle/lean mass components were normalized by height or BMI. Model 2 additionally adjusted for education and income. Model 3 consisted of model 2 plus body composition measures. Two versions of model 3 were analyzed: one with BMI, and the second with weight, ALM, and fat percentage. The model with the greatest variance in physical performance explained (R^2) was chosen. Finally, models 4 and 5 consisted of model 2 (excluding height) plus specific strength, Grip/ALMBMI and Quad30/TCSAht^2, respectively. The same modeling structure was used for usual gait speed and 400 m walk time. Models 1, 3, and 4 were also run among men and women with income greater than $50,000 and a minimum education level of a college degree as a sensitivity analysis. *P* values less than 0.05 were considered statistically significant. All statistics were analyzed using SAS, version 9.4 (SAS Institute, Inc., Cary, NC).

Results

Sample characteristics by sex and race are displayed in Table 1. Black men were younger, taller, and heavier than white men, with greater grip strength and higher ALM (all *p* values less than 0.05). Black men had fewer years of education; however, mean years of education for black and white men both reflected college completion (16 and 17 years, respectively). This was also reflected by the categorical assessment of education, as 84% whites and 68% blacks completed college (college graduate plus post-college). There were no racial differences in income observed in men.

Similarly, black women were younger, taller, heavier with higher fat percentage and lean mass, and stronger than white women (all *p* values less than 0.01). Black women also had higher specific strength than white women. There were no observed differences in education or income between black and white women.

We compared the demographics between those who did and did not complete the 400 m walk in men and women separately (Supplementary Table 1). The proportion of black and white participants who completed the 400 m walk did not differ. Men who did not complete the 400 m walk were older (81 vs 77 years) and had a higher BMI (28 vs 27 kg/m^2), higher fat percentage (34% vs 31%), lower grip strength (32 vs 38 kg), and lower ALM (23 vs 24 kg) than men who completed the 400 m walk. Women who did not complete the 400 m walk were older (82 vs 74 years) and shorter (1.58 vs 1.61 m), with higher fat percentage (43% vs 41%), lower grip strength (20 vs. 24 kg), lower ALM (16 vs 17 kg), and lower specific strength (34 vs 39 kg/m^2) than those who completed the 400 m walk. Therefore, in men and in women, the participants who completed the 400 m walk are a younger and healthier subset of the total analytic sample.

Sensitivity analyses were also conducted to compare those with and without Quad30/TCSAht^2 (Supplementary Table 2). There were no differences in sample characteristics for men. Women without Quad30/TCSAht^2 were older than those with this specific strength measure. No other differences in sample characteristics were observed in women.

The age-adjusted race and sex-specific means and standard errors of usual gait speed and 400 m walk are shown in Figure 1. Accounting

Table 1. Sample Characteristics

	Men			Women		
	White	Black		White	Black	
Mean (*SD*)	*n* = 439	*n* = 97	*p* Value	*n* = 412	*n* = 164	*p* Value
Age (years)	78.7 (8.4)	73.2 (8.1)	**<.01**	76.3 (9.1)	73.8 (8.0)	**<.01**
Education (years)	17.3 (2.5)	16.1 (3.2)	**<.01**	16.9 (2.5)	16.6 (2.4)	.25
Education categories			**<.01**			.53
Less than high school	0.9	5.2		0	0.6	
High school	5.3	12.4		8.3	8.5	
Some college	9.4	14.4		15.3	15.2	
College graduate	22.5	22.7		20.4	23.2	
Post college	61.9	45.4		56.0	52.4	
Income greater than 50k (%)	80.7	78.4	.61	65.9	69.2	.46
Height (m)	1.7 (0.1)	1.8 (0.1)	**.03**	1.6 (0.1)	1.6 (0.1)	**<.01**
Weight (kg)	82.3 (14.7)	88.5 (14.8)	**<.01**	67.1 (14.0)	76.1 (14.4)	**<.01**
BMI (kg/m^2)	27.3 (4.3)	28.9 (4.6)	**<.01**	26.1 (4.9)	29.1 (5.2)	**<.01**
Fat percentage	31.5 (7.7)	33.0 (6.7)	.09	40.0 (8.2)	43.8 (7.8)	**<.01**
Grip strength (Grip) (kg)	35.9 (16.9)	40.1 (9.1)	**<.01**	22.8 (13.4)	25.7 (6.6)	**<.01**
ALM (kg)	23.5 (3.4)	26.5 (3.8)	**<.01**	16.2 (2.4)	18.3 (2.7)	**<.01**
Quadricep peak torque at 30°/s (Quad30) (Nm)†	124.0 (37.4)	132.5 (49.5)	.18	82.1 (25.3)	89.4 (28.7)	**<.01**
Thigh cross sectional area (TCSA)/ht^2 (cm^2/m^2)‡	36.7 (7.9)	43.0 (10.3)	**<.01**	30.5 (5.4)	34.7 (7.8)	**<.01**
Grip/ALMBMI (kg/m^2)	41.7 (17.3)	43.7 (10.3)	.15	36.5 (22.9)	41.1 (11.0)	**<.01**
Quad30/TCSAht^2 (Nm/m^2)§	3.4 (1.0)	3.2 (1.1)	.23	2.8 (0.9)	3.4 (5.9)	.41

Note: 50k = $50,000, m = meters, kg = kilograms, s = seconds, Nm = newton meters, ht = height, cm = centimeters, grip = grip strength, BMI = Body mass index, ALM = Appendicular lean mass.

*Bold values are statistically significance at *p* value < .05.

†Quad 30 *n* = 317 (white men), 72 (black men), 292 (white women), 129 (black women).

‡TCSA/ht^2 *n* = 240 (whitemen), 46 (black men), 201 (white women), 70 (black women).

§Quad30/TCSAht^2 *n* = 138 (white men), 32 (black men), 137 (white women), 58 (black women).

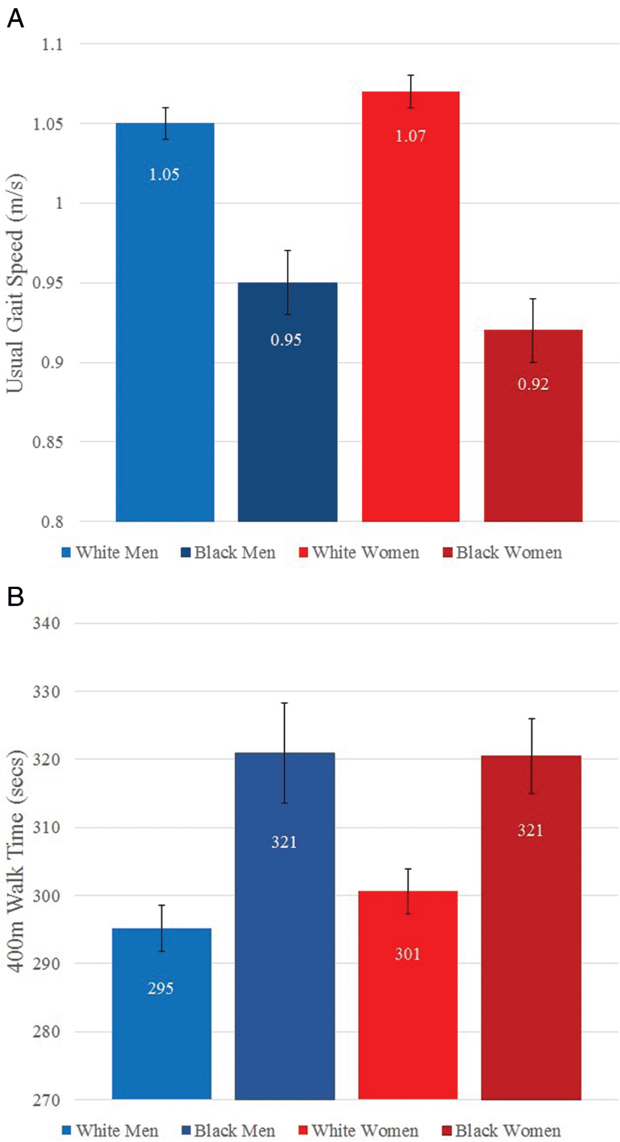

Figure 1. (**A**) Age-adjusted mean usual gait speed by race and sex *m/s = meters per second, secs = seconds. (**B**) Age-adjusted mean 400 m walk time by race and sex *secs = seconds.

for age, black men and women had slower gait speed and required more time to complete the 400 m walk than white men and women.

The associations between race, body composition, specific strength and physical performance in men are shown in Table 2. Black men had a 0.10 m/s slower gait speed than white men adjusting for age, education, income, height, and weight. Further adjustment for body composition measures did not attenuate the association of race. Adjustment for BMI produced comparable results as the model of weight, ALM, and fat percentage and did not decrease the association of race for either physical performance outcomes in men and women (data not shown). Neither specific strength measure was associated with usual gait speed in men and therefore did not affect the association of race. Black men required 22 more seconds than white men to complete the 400 m walk. Body composition did not decrease the association of race. Both specific strength measures were insignificant and therefore did not affect the association of race on 400 m walk time in men.

Black women had a 0.15 m/s slower gait speed than white women on adjustment for age, education, income, and height (Table 3). On adjustment for body composition, the association of race decreased by 0.02 m/s. Specific strength was not significantly associated with gait speed by either definition and thus did not decrease the impact of race. For 400 m walk time, black women required 22 more seconds to complete the walk than white women. Adjustment for body composition measures decreased the association of race by almost 16 seconds, approximately 74%. Neither specific strength measure was significantly associated with 400 m walk time in women and therefore did not decrease the race effect.

Given that some participants included in the analyses did not have a high education or income, we conducted sensitivity analyses restricting the sample to men and women with income greater than $50,000 and a minimum education level consistent with a college degree to determine if observed associations between race and physical performance remained. Results from these analyses (Supplementary Tables 3 and 4 for Men and Women, respectively) were consistent with those reported in the overall analytic sample.

Discussion

In a cohort of predominately college educated and non-impoverished older adults, black older adults have poorer physical performance than white older adults. The observed racial differences were clinically meaningful as well as statistically significant (30,31). Racial differences in physical performance in the BLSA were not attributable to years of education or income. Body composition did not attenuate the association of race in gait speed; however, it did attenuate the association of race in 400 m walk time in women. Specific strength, by either measure, did not attenuate the association of race in either physical performance outcome in men or women.

Although black men had statistically lower education than white men, most black and white men were college educated. A sensitivity analysis among men and women with income greater than $50,000 and a minimum education level consistent with a college degree produced results consistent with those reported in the overall analytic sample.

Body composition adjustment attenuated racial differences in women for the more demanding 400 m walk time, but not in men and not for gait speed in either sex. The observed sex differences in the role of body composition on physical performance are consistent with findings from other studies (9,14,16,28,29). The 400 m walk is an assessment of physical performance as well as aerobic capacity; therefore, it may be differentially affected by body composition compared to gait speed (32). Specific strength did not attenuate racial differences in physical performance. A sex- and race-stratified assessment of specific strength in the Health, Aging, and Body Composition (Health ABC) study reported black men and women to have lower specific strength than white men and women (17). In contrast, we observed similar specific strength among black and whites except for higher Grip/ALMBMI for black women than white women. It is important to note, however, that the Health ABC study used a different assessment of specific strength, knee extension strength divided by leg lean mass from dual-energy x-ray absorptiometry.

To the best our knowledge, this is the first study to assess racial differences in physical performance in a cohort of predominantly well-educated older adults of similar income. A previous analysis of

Table 2. Race and Physical Performance in Men

	Usual gait speed (m/s; n = 535)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Men	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Black	−0.11 (0.03)***	−0.10 (0.03)***	−0.11 (0.03)***	−0.09 (0.03)**	−0.10 (0.04)*
Age	−0.02 (0.001)***	−0.02 (0.001)***	−0.02 (0.001)***	−0.02 (0.001)***	−0.02 (0.002)***
Height (m)	0.07 (0.14)	0.03 (0.15)	0.09 (0.17)		
Education (categorical)		0.01 (0.01)	0.001 (0.01)	0.01 (0.01)	0.02 (0.02)
Income greater than 50k		0.06 (0.03)*	0.07 (0.03)**	0.07 (0.03)*	0.08 (0.04)*
Weight (kg)			−0.01 (0.002)***		
ALM (kg)			0.02 (0.01)***		
Fat percentage			0.002 (0.003)		
Grip/ALMBMI (kg/m^2)				0.001 (0.001)	
Quad30/TCSAht^2 (Nm/m^2)					0.03 (0.02)
	400 m Walk Time (s; n = 443)				
	Model 1	Model 2	Model 3	Model 4	Model 5
	b (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Black	27.1 (8.2)**	24.5 (8.3)**	27.5 (8.6)**	26.1 (8.5)**	27.9 (12.6)*
Age	5.5 (0.4)***	5.1 (0.4)***	5.5 (0.4)***	5.0 (0.4)***	4.4 (0.6)***
Height (m)	−14.9 (45.6)	1.7 (45.8)	−32.4 (52.1)		
Education (categorical)		−0.9 (3.2)	1.3 (3.2)	−0.5 (3.3)	−8.9 (4.9)
Income greater than 50k		−27.4 (8.0)***	−27.8 (7.9)***	−26.2 (8.3)**	−12.9 (11.4)
Weight (kg)			1.6 (0.6)**		
ALM (kg)			−3.8 (1.8)*		
Fat percentage			0.4 (0.9)		
Grip/ALMBMI (kg/m^2)				−0.3 (0.2)	
Quad30/TCSAht^2 (Nm/m^2)					1.6 (4.4)

Note: Models assessed the covariates listed in the far-left column and no additional covariates. m/s = meters per second, m = meters, 50k = $50,000, kg = kilogram, ALM = appendicular lean mass.

*p value < 0.05, **p value < 0.01, ***p value < 0.001.

racial differences in gait speed in Health ABC reported black participants to have lower education and income than white participants (6). Observed racial difference in gait speed in men and women persisted after adjustment for these socioeconomic differences (6). Another study that examined racial differences in gait speed reported black participants had fewer median years of education than white participants; however, significant racial differences in gait speed remained after adjustment for education (1). Despite the higher education and income of black BLSA participants compared to other cohorts, racial differences in physical performance were still evident.

This is also the first study to assess body composition and specific strength as potential correlates of racial differences in physical performance. A previous, race-stratified study assessed differences in the impact of obesity on physical performance and found that only black older adults with a BMI greater than 35 and in the highest quartile of waist circumference (greater than 106.4 cm and 110.2 cm in women and men, respectively) had slower gait speed than those with a lower BMI and in quartile 1 of waist circumference (33). White older adults had slower gait speed at each increase in BMI category, and in quartile 3 and 4 of waist circumference (greater than 97.3 cm and 102.4 cm in women and men, respectively) compared to quartile 1 (33). However, this analysis did not assess if obesity attenuated racial differences in performance.

Racial differences in physical performance observed cross-sectionally may not be meaningful clinically. Longitudinal analyses of racial differences in performance have found parallel trajectories between black and white older adults. The previously referenced Health ABC analysis by Thorpe *et al.* found racial differences in gait speed at baseline; however, no differences in 5 year rate of decline in gait speed were observed. Similarly, another study of longitudinal decline in physical performance, including gait speed and the 400 m walk, reported no racial differences in decline (31). An assessment of gait speed and survival reported no difference in relative risk by race (34). The latter two studies, however, did not examine racial differences in absolute values.

It has been suggested that observed racial differences in physical performance, particularly usual gait speed, may not be due to physiological disparities but instead cultural differences in preferred gait speed (35). Normative values for walking speed have been determined in predominantly white cohorts (36). In addition the effect of race was attenuated by body composition in women for the 400 m walk, which may be more sensitive in well-functioning older adults than gait speed (37). If differences are due to culture, race-specific clinically meaningful cut points for physical performance measures may be necessary to avoid overidentifying black older adults at risk for mobility limitations and disability. More research is necessary to determine the underlying process resulting in racial differences in performance, with consideration of cultural equivalency (38).

Another possible explanation for differences in walking speed by race may be differences in gait mechanics. A study that also observed similar racial differences in walking speed in black and white adults additionally found racial differences in gait mechanics; however, this

Table 3. Race and Physical Performance in Women

	Usual gait speed (m/s; n = 575)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Women	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Black	−0.15 (0.02)***	−0.14 (0.02)***	−0.13 (0.02)***	−0.14 (0.02)***	−0.15 (0.03)***
Age	−0.01 (0.001)***	−0.01 (0.001) ***	−0.01 (0.001)***	−0.01 (0.001)***	−0.01 (0.002)***
Height (m)	0.53 (0.15)***	0.52 (0.15)***	0.70 (0.17)***		
Education (categorical)		0.02 (0.01)	0.01 (0.01)	0.02 (0.01)	0.01 (0.02)
Income greater than 50k		0.03 (0.02)	0.03 (0.02)	0.03 (0.02)	0.05 (0.03)
Weight (kg)			−0.01 (0.002)***		
ALM (kg)			0.02 (0.002)*		
Fat Percentage			0.004 (0.002)		
Grip/ALMBMI (kg/m^2)				2.70 E–4 (5.13 E–4)	
Quad30/TCSAht^2 (Nm/m^2)					0.01 (0.005)
	400 m walk time (s; n = 472)				
	Model 1	Model 2	Model 3	Model 4	Model 5
	b (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Black	22.1 (6.4)***	21.6 (6.6)**	5.7 (6.8)	18.3 (6.9)**	29.0 (9.7)**
Age	4.3 (0.4)***	4.2 (0.4)***	5.0 (0.4)***	4.6 (0.4)***	3.9 (0.6)***
Height (m)	−139.5 (49.9)**	−136.9 (51.2)**	−308.5 (54.8)***		
Education (categorical)		−4.6 (3.0)	−2.0 (2.8)	−3.9 (3.1)	−4.3 (4.7)
Income greater than 50k		−7.8 (6.6)	−11.7 (6.2)	−9.4 (6.9)	−0.4 (9.6)
Weight (kg)			2.4 (0.6)***		
ALM (kg)			0.1 (2.4)		
Fat Percentage			0.5 (0.8)		
Grip/ALMBMI (kg/m^2)				0.3 (0.2)	
Quad30/TCSAht^2 (Nm/m^2)					−1.2 (1.2)

Note: Models assessed the covariates listed in the far-left column and no additional covariates. m/s = meters per second, m = meters, 50k = $50,000, kg = kilogram, ALM = appendicular lean mass.

*p value < 0.05, **p value < 0.01, ***p value < 0.001.

study was conducted among adults with osteoarthritis (39). An assessment of gait mechanics in black and whites women at midlife (40–55 years) reported no racial differences in total gait cycle time, stride length, or double support time (40). Further analysis of racial differences in gait mechanics in cohorts of healthy older adults may elucidate the mechanisms behind observed differences in performance.

Study strengths include participant demographics, particularly similarly high income, and education, as well as the sample size. The inclusion of dual-energy x-ray absorptiometry-acquired body composition allowed for a more sophisticated assessment of body composition than BMI alone. In addition, assessment of two specific strength measures permitted evaluation of relative strength. This study is limited by its cross-sectional design, and the results are not broadly generalizable as the BLSA is not a representative cohort. The exclusion of BLSA participants seen in their home restricts the study results to healthy older adults without mobility limitations or disability. In addition, the study does not assess childhood socioeconomic status or quality of education. The study does ask whether a participant's income meets their needs, whether they were unable to receive a medical procedure due to income, and whether they were unable to receive a medication due to income. There were no racial differences in the response to these three questions. In addition, very few participants reported "yes" for these questions, thus they were not included as covariates in the analyses.

Although this study provides additional information on racial differences in physical performance in older adults, additional work is necessary to better understand the mechanisms underlying these differences and the extent to which these differences translate to increased risk. Future research should assess additional phenotypes that could be associated with racial differences in physical performance. It would also be beneficial to compare trajectories of gait speed in blacks and whites across the lifecourse to determine when differences occur.

Racial differences in physical performance exist in the BLSA, independent of recent income and years of education. Although weight attenuated the association of race for the more challenging fast 400 m walk time in women, body composition and specific strength did not attenuate observed differences in usual gait speed. Additional research is needed to determine the factors that contribute to racial differences in physical performance in older adults. Knowing which factors contribute to racial differences in performance would help elucidate the underlying mechanisms of these differences as well as ways to intervene to reduce or eliminate these differences.

Supplementary Material

Supplementary data is available at *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences* online.

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Conflict of Interest

None.

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