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Physical performance and cognition in an ethnically diverse cohort of oldest-old individuals: The LifeAfter90 study

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Abstract

Background: In prior studies of oldest-old, poor physical performance is associated with cognitive impairment and risk of incident dementia, though this was in highly educated Caucasians. There is limited data on physical performance in diverse cohorts of oldest-old. Identification of how physical performance is emblematic of frailty, health, and underlying pathology in representative populations is essential. Here we examine the cross-sectional association between physical performance and cognitive function among the first 610 participants enrolled in *LifeAfter90*, an ongoing multiethnic oldest-old cohort.

Method: LifeAfter90 participants are long-time members of the Kaiser Permanente Northern California Health Care System without a dementia diagnosis in their medical record at the time of recruitment. Evaluations are every six months and include a neuropsychological tests with the Spanish and English Neuropsychological Assessment Scales (SENAS) and physical performance measures (4-meter walk and hand grip). The SENAS assesses domains of episodic memory, semantic memory, and executive function. 4-meter walk was measured twice and averaged, handgrip was measured 3 times in the dominant hand and averaged. Using linear regression, we studied the cross-sectional associations between the two physical performance measures and SENAS cognitive domains across racial/ethnic groups adjusted for age, gender and education.

Result: At baseline, participants were on average 92.6 years of age, 62% were women, 45% had a college education, and 68% were racial/ethnic minorities (Table 1). Overall, those with better grip strength and shorter walk time had better cognitive scores overall, and across all three domains. However, when stratifying by race these associations were not ubiquitous across all groups (Table 2). Namely, physical performance was only associated with executive function in Whites (Table 2); while physical performance was consistently associated with all three domains in Black, Latino, and Asian oldest-old individuals.

Conclusion: In this oldest-old, racially/ethnically diverse cohort, physical performance is associated with better executive function, semantic memory and verbal episodic

memory. Markers of frailty and health may have different meaning in diverse populations. Understanding differences in the association between physical performance and cognitive performance is crucial as they could reflect racial/ethnic differences on burden of pathology.

TABLE 1

Table1. Baseline Characteristics of Participants by Race/Ethnic Group: The *LifeAfter90* Study

Characteristic	Total	White	African American	Latino	Asian	Multiracial /Other
No. of Participants (%)	610	198	136	85	138	53
Demographics						
Average Age, y (range)	92.5 (90-104)	92.7 (90-98)	93.0 (90-102)	92.2 (90-104)	91.9 (90-102)	91.9 (90-98)
No. of Women (%)	380 (62.30)	122 (61.62)	92 (67.65)	57 (67.06)	72 (52.17)	37 (69.81)
Education, N (%)						
≤High School	210 (34.65)	51 (26.02)	60 (44.44)	49 (58.33)	33 (23.91)	17 (32.08)
Some College	123 (20.30)	40 (20.41)	27 (20.00)	17 (20.24)	21 (15.22)	18 (33.96)
Associate Degree/College	156 (25.74)	49 (25.00)	30 (22.22)	11 (13.10)	53 (38.41)	13 (24.53)
Graduate School	117 (19.31)	56 (28.57)	18 (13.33)	7 (8.33)	31 (22.46)	5 (9.43)
Physical performance						
Avg. Hand Grip, kg. (SD)	16.39 (7.24)	16.07 (7.33)	17.71 (7.57)	15.50 (6.70)	16.27 (6.82)	15.89 (7.81)
Avg. Walking Speed, sec. (SD)	8.92 (6.23)	8.27 (3.67)	11.11 (10.92)	9.15 (4.32)	7.62 (3.18)	8.74 (4.25)
SENAS						
Avg. Episodic Memory (SD)	-0.80 (0.76)	-0.79 (0.74)	-0.78 (0.71)	-0.97 (0.84)	-0.76 (0.80)	-0.74 (0.78)
Avg. Semantic Memory	-0.78 (0.98)	-0.14 (0.70)	-1.34 (0.83)	-0.88 (0.80)	-1.00 (1.10)	-0.89 (0.89)
Avg. Executive Function	-0.47 (0.70)	-0.19 (0.75)	-0.66 (0.65)	-0.69 (0.59)	-0.54 (0.63)	-0.48 (0.64)

Abbreviations: SENAS= Spanish and English Neuropsychological Assessment Scales; SD=standard deviation

TABLE 2

Table 2. Multiple Regression Coefficients[1] for The Association Between Physical Performance Measures and SENAS Domains Across Racial/Ethnic Groups

Physical Performance	SENAS Domain	Total	White	Black	Latino	Asian	Multiracial /Other
Average Grip Strength (dominant hand)	Episodic Memory	.022	.010	.026	.058	.016	.042
	Semantic Memory	.026	.008	.033	.021	.031	.067
	Executive Function	.025	.019	.027	.019	.025	.032
Average Walk Time	Episodic Memory	-.016	-.012	-.015	-.047	-.038	.029
	Semantic Memory	-.021	-.024	-.011	-.061	-.079	-.022
	Executive Function	-.027	-.061	-.015	-.051	-.074	-.017

p<0.001 p<0.01 p<0.05 p<0.1

[1] Coefficients are from multiple linear regression models with SENAS domain as the outcome and physical performance measures as the independent variable of interest adjusting for age, sex, and education. Analyses of the total cohort also adjusted for race/ethnicity. Abbreviations: SENAS= Spanish and English Neuropsychological Assessment Scales