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Prevention (nonpharmacological) / Multidomain

Effect of sex and physical and cognitive activities on cognitive reserve in a cohort of ethnically diverse, community-dwelling older adults

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Abstract

Background: Physical activity and cognitive stimulation may reduce age-associated cognitive decline, delay dementia onset, and increase cognitive reserve. However, whether the association between these activities and cognitive reserve differs by sex has not been well-studied. The current study examined interactions between sex and physical or cognitive activities on speed and memory reserve in older adults.

Method: Research participants from the Washington Heights-Inwood Columbia Aging Project (WHICAP) with normal cognition, mild cognitive impairment, or dementia were included in this study (N=758, age=76.11±6.31, 62% female). Participants were selected based on available measures of 3T brain MRI, physical activity, cognitive activity, and cognition. Speed and memory reserve were calculated as the residuals from regression models partialling out hippocampal volume, total gray matter volume, and white matter hyperintensity volume from speed and memory composite scores, respectively. Physical activity was assessed using the Godin Leisure Time Exercise Questionnaire, converted to metabolic equivalents (METS). Self-reported cognitive activity (COGACT) was calculated as the sum of three yes/no questions. Sex-by-activity (METS or COGACT) interactions and sex-stratified analyses were conducted using linear regression models. Covariates included age, cohort, education, race/ethnicity, and diagnosis. A secondary analysis considered the effect of APOE4 status based on literature that APOE4 may differentially affect women and men.

Result: Women who reported more physical activity had greater speed reserve, and this effect was not observed for men. Physical activity was not associated with memory reserve. More cognitive activity was associated with greater speed reserve, and this association did not differ by sex. Women, but not men, who reported more cognitive activity had a trend for greater memory reserve. Among women, APOE4 carrier status attenuated relationships between physical activity and speed reserve, and between cognitive activity and speed and memory reserve.

Conclusion: The associations between self-reported physical and cognitive activities and cognitive reserve are more pronounced in women; although women with APOE4 have less benefit from physical or cognitive activity than women without APOE4. Intervention studies that consider sex and APOE4 status are necessary to understand causal effects of physical and cognitive activities on brain and cognitive health.

TABLE 1

Table 1. Demographics	Group	Separated by sex	
	All	Men	Women
N	758	284; 38%	474; 62%
Age (yrs)	76.11 (6.31)	75.27 (5.82)	76.63 (6.53)
Sex (Male/Female); %	284/474; 38/62%	284	474
Race (Black/Hispanic/White); %	292/224/242; 38/20/32%	97/82/105; 34/29/37%	195/142/137; 41/30/29%
Education (yrs)	12.14 (4.49)	12.18 (4.58)	12.11 (4.44)
Diagnosis (CN/MCI/AD); %	449/242/67; 59/32/9%	170/95/19; 60/33/7%	279/147/48; 59/31/10%
APOE4 status (Non-carrier/Carrier); %	545/213; 72/28%	206/78; 73/27%	339/135; 71/29%
METS(log)	4.25 (5.14)	4.91 (4.82)	3.85 (5.30)
Cognitive Activity	1.42 (.70)	1.39 (.67)	1.45 (.72)
Speed Reserve	.06 (.92)	.044 (.83)	.069 (.965)
Memory Reserve	.004 (.73)	-.13 (.73)	.087 (.73)