

# Measures of Exercise and Cognition in Individuals at High Risk for Alzheimer's Disease

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## Purpose

Alzheimer's disease (AD) is the most common form of dementia and has emerged as one of the biggest threats to public health and personal well being among older adults.<sup>2</sup> Individuals with a parental history of AD are more likely to become afflicted with AD than those without.<sup>1</sup> African Americans are 64 percent more likely to develop AD than Caucasians, which increases the public health burden of AD in the US as the non-Caucasian population becomes the majority.<sup>5</sup> Thus, in an effort to prevent AD, we must identify high risk individuals and implement economically feasible and modifiable treatment regimens. Increased physical activity has been shown to exert a positive neurophysiological effect on cognitively normal, older people at high risk for AD.<sup>3,4</sup> Potential racial differences on the impact of exercise on cognition is unknown. Here, we investigate the potential relationship between exercise and cognition in Caucasians and African Americans with a parental history of AD.

## Participants

➤ Seventy nine subjects ages 59.4 +/- 6.5 years with a parental history of AD.

## Exercise

➤ Exercise patterns were assessed utilizing a short, multiple choice questionnaire on the frequency, time of day, duration and intensity of their cardiovascular exercise routine.

## Cognition

➤ Use variety of tasks to measure cognitive domains including executive function, working memory, and verbal and visuospatial ability.

## Results

**Table 1:** Participant Demographics by Race.

	Black N=29	White N=45
Age	59.4 +/- 8.12	58.53 +/- 6.18
Gender (%Female)	86.2%*	57.8%*
College Graduate or Greater Level of Education	89.7%	82.3%
Income (race difference in all brackets)*		
Income \$39,000 or less	27.5%	11.1%
Income \$40,000-\$79,000	48.2%	24.4%
Income \$80,000 or more	24.1%	64.4%

**Table 2:** Cognitive Data for All Participants.

	Black N=29	White N=45
MOCA	25.5 +/- 2.13*	26.8 +/- 2.37*
Benson Immediate Recall	15.4 +/- 1.11	15.8 +/- 0.50
Benson Delay Recall	10.6 +/- 3.66	10.5 +/- 3.24
Buschke Delay Recall	5.45 +/- 3.22*	7.11 +/- 2.85*
MINT	29.3 +/- 2.23*	30.5 +/- 2.57*
MRT	16.4 +/- 5.18	17.6 +/- 5.96
Trails A s.	35.8 +/- 10.9*	29.7 +/- 8.6*
Trails B s.	107.8 +/- 86.97*	78.62 +/- 40.89*
Forwards Digit Span	10.30 +/- 2.41	10.69 +/- 2.40
Backwards Digit Span	5.86 +/- 2.18	6.71 +/- 2.93

**Table 1** shows our high risk sample is middle aged, mostly female and highly educated. While Blacks and Whites are similar on age and education, our Black participants consist of a higher percentage of females and report significantly less income compared to Whites.

**Tables 2 and 3** show results of our exercise and cognitive measures. Cognitive test performance differed significantly in Blacks and Whites, such that Whites outperformed Blacks on 8 of 9 tests. Blacks and Whites did not significantly differ on any exercise measure. All correlations controlled for age, sex, and education.

**Table 3:** Exercise Measures and Data for All Participants.

	Black N=29	White N=45
Any type of Exercise: Frequency		
Never	6.9%	2.2%
Once per month	6.9%	2.2%
1-4 times per month	27.6%	22.2%
Greater than once a week	58.6%	73.3%
Aerobic Activity (Last 4 months)		
Yes	75.9%	80.0%
Span of Aerobic Activity		
0-2 months	26.3%	14.3%
2-4 months	73.7%	85.8%
How often Weekly		
1-2 times a week	42.1%	42.9%
3-4 times a week	42.1%	45.7%
5-6 times a week	15.8%	8.6%
Every day	0%	2.9%
Time of Aerobic Activity		
Morning	47.4%	62.9%
Afternoon	15.8%	28.6%
Evening	36.8%	8.6%
Duration of Aerobic Activity		
0-30 minutes	26.3%	34.3%
31-60 minutes	88.4%	60%
Over 60 minutes	5.3%	5.7%
Intensity of Aerobic Activity		
Light	26.3%	37.1%
Moderate	63.2%	42.9%
Heavy	10.5%	20%

## Exercise and Cognition

➤ Significant relationship between exercise on cognitive measures of working memory ( $r=.372$ ,  $p=.03$ ;  $r=-.360$ ,  $p=.01$ ) and visuospatial memory ( $r=.382$ ,  $p=.05$ ), such that longer exercise duration was reported to better cognitive performance. Notably, this benefit was only seen in Whites.


## Conclusion

➤ Racial differences on cognitive performance in high risk individuals with a parental history of AD.  
➤ The differences in cognition cannot be explained by age or education in our healthy, middle-aged subjects.  
➤ Exercise duration may partially explain racial differences on cognitive test performance.

## Future Directions

➤ Physiological measures, such as percent body fat, peak VO<sub>2</sub>, and blood pressure could also be considered.  
➤ Future studies should incorporate more sensitive exercise measures such as an implemented aerobic exercise program.

## REFERENCES

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- <sup>1</sup>Alz.org(2017). 2017 Alzheimer's Disease Facts and Figures.
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