Cognition & Healthy Lifestyle Factors in Healthy Older Adults

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Introduction

- The number of older adults in the U.S. experiencing cognitive decline is increasing rapidly due to the aging of America.
- For this reason, researchers have focused on the identification of lifestyle factors, such as physical activity and sleep quality, that promote brain health in older adulthood.
- The literature suggests that physical activity and good sleep quality may be positively associated with increased levels of cognitive function in older adulthood.

Objectives

- Examine the relationship between physical activity, sleep quality, and cognition in healthy older adults.
- Determine the degree to which self-report measures of physical activity and sleep quality correlate with objective measures.

Method

Participants

- Participants ($N = 45$) were community dwelling healthy older adults (See Table 1).

Table 1: Demographic Data

	Mean	SD
Age (Years)	67.1	7.82
Education (Years)	14.6	5.93
Gender (% Female)	78.4	–
TICS Total Score	32.8	9.54

Note: TICS = Telephone Interview for Cognitive Status

Cognitive Tests

Participants were administered the following cognitive tests as part of a larger neurocognitive evaluation:

Selective Attention: Plus-Minus Task

- The participant was given a sheet with 30 equations on it and three timed trials were administered: addition, subtraction, and addition-subtraction.
- The dependent variable used in the analysis was task switch cost (calculated by subtracting the average time from the first two trials from the time on the third trial).

Reasoning: The Brixton Spatial Awareness Test

- The participant is to identify an inferred rule from the placement of a blue circle among an array of unfilled circles.
- The dependent variable was total errors.

Working Memory: Letter-Number Sequencing

- The participant was presented with a series of numbers and letters, and then asked to recite both back in ascending order.
- The dependent variable was total spans correct.

Task-Switching: Trail Making Test-B

- The participant was to connect 25 circles in ascending order, with the added task of alternating between numbers and letters.
- The dependent variable was total time.

Lifestyle Factors

Self-Report Measures

- Physical Activity: Community Healthy Activity Program for Seniors (CHAMPS)
  - A questionnaire that assesses the weekly frequency and duration of 40 different activities undertaken by older adults.
- Sleep Quality: Pittsburgh Sleep Quality Index (PSQI)
  - A questionnaire that assesses the quality and patterns of sleep in older adults over the prior month by measuring seven domains to compute a global sleep quality score.

Objective Measures

- Withings Pulse O_2

Participants ($N = 11$) were instructed to wear the Withings Pulse O_2 for seven days and averages were computed for distance (miles/day) and sleep (minutes/night).

Results

Selective Attention: Plus-Minus Task

- In a hierarchical regression analysis, after controlling for age, the overall model (See Table 2) approached statistical significance and accounted for 21% of the variance in selective attention performance [$\Delta R^2 = .148$], with self-reported physical activity as a unique predictor of selective attention performance.

Table 2: Hierarchical Regression of Lifestyle Factors on Selective Attention Performance

	β	t	p	R^2	F	Δ R^2
Model I						
Age	.248	1.42	.165	.061	2.03	
Model II						
Age	.277	1.36	.185			
CHAMPS Moderate	-.340	-2.05	.050•			
PSQI	.187	1.13	.268			
Overall Model			.075	.209	2.56	.148

•p = .05

Reasoning: The Brixton Spatial Awareness Test

- In a hierarchical regression analysis, the overall model (See Table 3) did not explain variance on reasoning performance [$\Delta R^2 = .021$], nor did it account for additional variance in reasoning performance when self-reported physical activity and sleep quality were added to the model.

Table 3: Hierarchical Regression of Lifestyle Factors on Reasoning Performance

	β	t	p	R^2	F	Δ R^2
Model I						
Age	.249	1.41	.170	.062	1.98	
Model II						
Age	.207	1.08	.288			
CHAMPS Moderate	-.053	-2.89	.775			
PSQI	-.132	-.681	.501			
Overall Model			.484	.083	.839	.021

Working Memory: Letter-Number Sequencing

- In a hierarchical regression analysis, after controlling for age, the overall model (See Table 4) accounted for 41% of the variance in working memory performance, [$\Delta R^2 = .012$], with most of the variance accounted for by age [$R^2 = .393$].

Table 4: Hierarchical Regression of Lifestyle Factors on Working Memory Performance

	β	t	p	R^2	F	Δ R^2
Model I						
Age	-.627	-4.62	.000*	.393	21.4	
Model II						
Age	-.642	-4.59	.000*			
CHAMPS Moderate	-.047	-.333	.741			
PSQI	-.097	-.697	.491			
Overall Model			.001*	.405	7.04	.012

*p < .05, **p < .001

Task-Switching: Trail Making Test-B

- In a hierarchical regression analysis, after controlling for age, the overall model (See Table 5) accounted for 39% of the variance in task-switching performance, [$\Delta R^2 = .126$], with self-reported sleep quality as a unique predictor of task-switching performance.

Table 5: Hierarchical Regression of Lifestyle Factors on Task-Switching Performance

	β	t	p	R^2	F	Δ R^2
Model I						
Age	.509	3.40	.002*	.259	11.5	
Model II						
Age	.522	3.67	.001*			
CHAMPS Moderate	-.177	-1.25	.221			
PSQI	.321	2.26	.031*			
Overall Model			.002*	.385	6.47	.126

*p < .05

Exploratory Analyses

- A correlation analysis of objective and self-reported physical activity revealed a moderate, but non-significant relationship, [$r = .455$, $p = .159$].
- A correlation analysis of objective and self-reported sleep quality revealed a moderate, but non-significant relationship, [$r = .424$, $p = .282$].

Conclusion

- The results of the current study indicate that physical activity and sleep quality may play a role in supporting cognition in healthy older adults.
- Consistent with prior work, the results also revealed a discrepancy between subjective and objective measures of physical activity and sleep quality.
- It will be important to further examine lifestyle factors as they pertain to cognition using both objective and self-report measures.

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