Maaz K. Rathor
High School
Patrick F. Taylor Science & Technology Academy, New Orleans, LA, 70094

Dr. Hui-Yi Lin, Dr. Tung Sung Tseng, Masuma Mannan, and Gabrielle Gonzalez
School of Public Health, Louisiana State University Health Sciences Center

Sleep Duration and Physical Activity Associated with Cognition in Older U.S. Adults

Background: The United States Census Bureau found that between 2010 and 2020, the number of individuals 65 and older in the United States increased by 15.5 million people. With the growing elderly population, considering cognitive health among this demographic is important. Cognitive aging impacts the mental processes associated with concentrating, reasoning, comprehending, learning, resolving problems, and judgment. Lifestyle factors such as physical inactivity, substance use, chronic stress, and or sleep disorders can accelerate cognitive decline. Although sex differences in cognition are well documented, few studies stratify their analyses by gender when examining sleep and physical activity. The original purpose of this study was to use a sex stratified approach. However, due to the time limit of the internship, this study was only the first step in the research process and aimed to explore the association of sleep and physical activity with cognitive function in older adults aged 60 years and older.

Methods: The data used for this study was derived from the National Health and Examination Survey (NHANES) 2011-2014. To be eligible for this study, respondents had to be aged 60 or over, have no missing values for Digit Symbol Substitution Test (DSST) results (primary outcome), sleep duration, and physical activity (primary predictors). The total sample size was 3147. The DSST, a 2-minute paper-and-pencil subtest of the WAIS-III, requires matching symbols to numbers under time pressure and measures processing speed, sustained attention, working memory, and visuomotor coordination, with higher scores being better. Potential factors we considered in the study included age, education level, race, smoking status, marital status, body mass index, and income, measured using the family income to poverty ratio. Analyses were conducted using the Statistical Analysis System (SAS) and the predictors associated with DSST were tested using univariate and multivariate regression models.

Results: In univariate analyses, DSST scores differed by race, age, gender, education, marital status, income, smoking, sleep, and MVPA (all $p < .001$), but not BMI ($p = .503$). In multivariable linear regression, cognitive scores remained lower among Hispanic ($\beta = –9.8$, $p < .001$), non-Hispanic Black ($\beta = –10.6$, $p < .001$) and Other ($\beta = –4.2$, $p < .001$) participants versus Whites, and declined with age (70–79 yrs: $\beta = –8.2$, $p < .001$; ≥ 80 yrs: $\beta = –15.5$, $p < .001$). Males scored lower than females ($\beta = –5.4$, $p < .001$), while higher education (HS/GED: $\beta = 9.5$; some college: $\beta = 13.5$; college +: $\beta = 16.5$; all $p < .001$) and higher income-middle-income ($\beta = 4.1$, $p < .001$) and high-income ($\beta = 8.3$, $p < .001$) predicted better performance. Long sleep (≥ 8 h: $\beta = –2.1$, $p < .001$) and insufficient MVPA (< 150 min/wk: $\beta = –2.6$, $p = .001$) also remained significant.

Conclusions: Cognitive performance was independently lower in racial minorities, older adults, and men, and higher with advanced education and higher income. Long sleep duration and low physical activity were also linked to poorer DSST scores. Findings support the continued need for interventions in education, socioeconomic support, sleep hygiene, and exercise to preserve cognition.