

Are There Differences in EEG Metrics Between Younger and Older Healthy Adults When Performing Challenging Cognitive Tasks?

Brian Cheah, Greta Davis, Dylan Bergstedt, Jessica Chao, and Nancy Zelaya

Supervision Professors: Dr. Janet Trammell and Dr. Priscilla MacRae

The prevalence and cost of dementia continues to rise, with the cost of treatment in the U.S. estimated at \$157 billion per year (Hurd et al., 2013). Understanding cognitive function in older adults and associated brain activity could lead to the development of better prevention and treatment of dementia. Therefore, this study examined the effects of aging on brain activity, as measured by electroencephalography (EEG) in younger and older adults. EEG activity was monitored before, during, and after healthy older (70-79 years of age; N = 20) and younger adults (20-29 years of age; N = 16) completed three computerized cognitive tasks. A one way ANOVA with Bonferroni correction for multiple comparison, $p < 0.05$, was completed to determine age effects on cognitive performance and EEG metrics. As hypothesized, younger adults performed significantly better on reasoning (Raven's Matrices), short term memory, and inhibitory control (Stroop) tasks. The most significant age difference in the EEG metrics were higher beta amplitude, power, and relative power in older adults, a finding that is suggestive of increased anxiety. As hypothesized, the older adults exhibited lower eyes-closed theta power. However, lower eyes-open alpha amplitude and relative power in older adults was contrary to expectations. In conclusion, these otherwise healthy older adults exhibited declines in cognitive performance and suboptimal brain activity. More research is needed to determine if physical activity, meditation, or cognitive training can improve cognitive performance and brain activity.