

Age differences in resting state EEG and their relation to eye movements and cognitive performance

ABSTRACT:

Background

Given the high proportion of older adults in society, it is important to understand age-related changes in brain activity as these changes may predict deficits in working memory and inhibitory control. Further research is needed to establish if EEG biomarkers relate to either cognitive decline or healthy adaption to ageing.

Aims

The goal of the current study was to bridge the gap between cognitive and physiological (EEG) assessment in the context of age-related decline by assessing the relationship between changes in resting state brain activity and inhibitory eye-movements. The aims were: a) to compare brain activity across younger and older adults b) to see if brain activity relates to performance on the cognitive tests and c) to assess the relationship between inhibitory eye-movements and brain activity.

Method

Eighty-one healthy participants (32 younger adults, 48 older adults) completed a battery of cognitive tests to assess inhibitory control, attention switching and verbal/spatial working memory. Eye-tracking measures were also used to assess inhibitory control. EEG was used to measure alpha power, alpha peak frequency, beta, theta and delta activity. Older adults also completed assessments for depression and cognitive impairment.

Results

When compared to younger adults, older adults showed increased beta activity and decreased alpha peak frequency overall. There was no relationship between frontal or parietal theta activity and any of the cognitive tests. However, there were relationships between alpha peak frequency and measures of inhibitory control, attention switching, and spatial working memory. Occipital beta and alpha power were able to predict performance on one of the inhibitory control (NoGo) eye-movement tasks.

Conclusions

The results were able to shed light on potential EEG biomarkers for healthy cognitive ageing using a combination of cognitive and physiological measures. Future research could extend these findings by testing patients with mild cognitive impairment.

Keywords

EEG, Eye tracking, Working memory, Inhibition

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