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Objective: Executive function is known to decline in later life, largely attributed to structural and functional changes in the prefrontal cortex. However, other regions of the brain are integral to executive functioning, including the hippocampus. The hippocampus plays a large role in memory but its intricate connections to limbic regions including the prefrontal cortex likely underlies associations between the hippocampus and executive functions. Due to the hippocampus' complex structure, hippocampal subregions may be differentially associated with executive function, but this possibility remains largely unexplored. Therefore, we examined the association between volume of the hippocampus and its subregions with executive function to understand these relationships across the adult lifespan.
Participants and Methods: The study included 32 healthy, community-dwelling participants (age range = 18-81, mean age = 51.06 ± 20.98, 91% white, 72% female) who received a 3-Tesla magnetic resonance imaging (MRI) scan and completed a cognitive battery. We calculated an executive composite based on Trail Making Test Part B and the interference score from the Stroop Color and Word Test. Freesurfer (version 5.3) as used to quantify total hippocampal volume and subfield volumes for CA1, CA2-3, CA4-dentate gyrus, subiculum, and presubiculum. We conducted mixed-effects regression analyses with total hippocampal and subfield volume, age group (young, middle-aged, and older), and their interaction predicting the executive function composite, controlling for total intracranial volume.
Results: Larger hippocampal subregion volumes in CA1 ($p = 0.03$), the subiculum ($p = 0.01$), and the CA4-dentate gyrus ($p = 0.04$) predicted better executive function. Total hippocampal volume and the presubiculum were not significantly associated with the executive function composite. The age group interaction was not significant for any of the models. Follow-up analyses by hemisphere showed that the effects were right lateralized in CA1and CA4-dentate gyrus, and bilateral in the subiculum.
Conclusions: These data support the literature demonstrating the involvement of the hippocampus in executive function and demonstrates variation across hippocampal subfields. The lack of significant age interactions suggests these relationships may not differ across the lifespan, although this finding would need to be replicated in larger samples. These findings support previous literature showing CA4-dentate gyrus' association with neurogenesis may facilitate better executive function by increasing connection strength among CA1, CA2-3, and the frontal cortex. This study contributes to our understanding of how specific hippocampal subregions relate to executive function, which has both clinical and research implications.

Categories: Neuroimaging
Keyword 1: hippocampus
Keyword 2: executive functions
Keyword 3: aging (normal)
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59 Investigating the Relationship Between Neuropsychological Test Performance and Electrophysiological Measures of Semantic Functioning in Alzheimer's Disease.

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Objective: Improving the timeline for intervention in Alzheimer's disease (AD) has considerable potential to delay and mitigate disability and suffering. Neuropsychological assessment is useful for distinguishing AD from normal aging and other dementias but is less useful in preclinical detection due to its limited sensitivity. The N400 (N4), a language-based EEG event-related potential (ERP) related to semantic functioning, is a promising candidate marker of AD with potential to improve early detection and monitoring of AD. For example, studies have shown that individuals with AD show a reduced N4 "effect"—a smaller

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difference in the size of the N4 to semantically congruent vs. incongruent word-pairs. The goal of this study is to assess the presence of the N4 effect in healthy seniors, and those with amnestic mild cognitive impairment (MCI) or mild AD, and to evaluate associations between performance on the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) and the N4 across these samples.
Participants and Methods: Fifty older adults (intact=27, combined MCI/mild AD group=23; "impaired") completed neuropsychological testing, including the RBANS, as part of a larger study. Participants were re-contacted and returned for EEG assessment between several weeks to one year later. During EEG recording, participants completed a word-pair judgement paradigm, which involved distinguishing between semantically congruent and incongruent word-pairs. Data was collected and analyzed according to customized N4 analysis scripts provided as part of ERPCORE, an online resource for acquiring and analyzing common ERP components (Kappenman et al., 2021; https://osf.io/thsqg/). The change in N4 amplitude between congruent and incongruent trials (the N4 effect) was used as an index of participants' semantic functioning. Participants' N4 effect was quantified using the mean amplitude from 300-550 milliseconds post-stimulus at electrode Cz.
Results: Repeated measures ANOVAs indicated a significant effect of trial type on the N400 amplitude in the intact individuals ($F(1, 26)=77.66$, $p<.001$), which remained significant in the sample as a whole ($F(1, 48)=65.18$, $p<.001$). Although intact participants numerically showed a larger N4 effect (intact: M=-4.02, SD= 2.37; impaired: M=-2.60, SD=3.40), the expected group-by-trial interaction was not significant ($F(1, 48)=3.01$, $p=.089$). Correlational analyses revealed no significant associations between the N4 effect and the RBANS Total Scale scores ($r=-.14$, $p=.32$), nor for the Immediate Memory ($r=-.002$, $p=.99$), Visuospatial/Constructional ($r=-.069$, $p=.63$), Language ($r=-.15$, $p=.30$) Attention ($r=-.21$, $p=.14$), or Delayed Memory ($r=-.18$ $p=.58$) indexes.
Conclusions: Results confirmed the presence of the N4 effect in intact participants and in the sample as a whole. Although the N4 effect was numerically smaller in the impaired group as expected, this difference was not significant in the present sample. Likewise, we observed no evidence for associations between the size of N4 effect and performance on RBANS indexes. Overall, the present study provides mixed evidence for the utility of the N4 as a biomarker in mild AD. Factors that may have contributed to the lack of associations between the N4 effect and the RBANS include the limited sample size and variable lengths of time between participants' initial cognitive assessments and EEG testing.

Categories: Neurophysiology/EEG/ERP/fMRI
Keyword 1: dementia - Alzheimer's disease
Keyword 2: electroencephalography
Keyword 3: neuropsychological assessment
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60 Neural Correlates of the Self-Reference Effect: Neuronal Mechanisms Supporting Self-Referential Encoding

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Objective: Self-concept is a mental representation of the self—an internal sense of personal identity. This complex representation is unique to the human mind. Behavioral studies on self-concept have demonstrated that self-relevant information is remembered better than other types of information, a phenomenon commonly known as the "self-reference effect" (SRE). However, the underlying neural mechanisms of SRE remain largely unknown.
Participants and Methods: Here, we recorded neural activity from ~600 neurons from 15 neurosurgical epilepsy patients, who were implanted with depth electrodes for seizure monitoring. The SRE paradigm consisted of an incidental learning (encoding) task and subsequent memory recognition test. During the incidental learning task, participants were asked to rate various personality traits in three distinct encoding conditions: the self, a friend, and a celebrity. In the recognition part of the task, participants were asked to distinguish between traits that were presented during the encoding

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