

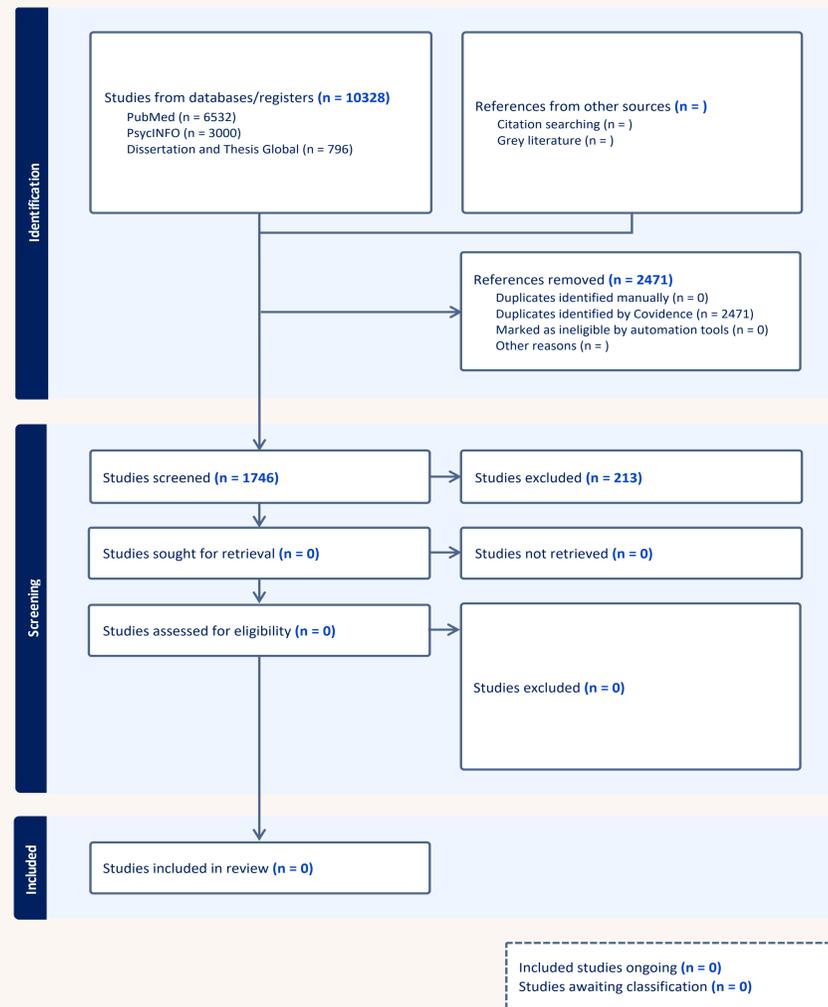
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Introduction

Alzheimer's Disease (AD) is the most common form of dementia, a progressive neurological condition that affects memory, focus, and spatial orientation, impacting millions worldwide. With an aging population, cases are expected to triple by 2060, placing a significant burden on caregivers and healthcare systems. Early detection is critical for intervention and treatment, making cognitive evaluation essential for diagnosing and tracking AD. However, the reliability and validity of cognitive tests vary, which is why meta-analysis plays a crucial role in research by combining findings from multiple studies to identify the most effective assessment measures. This research aims to enhance diagnostic accuracy, improve clinical decision-making, and provide valuable insights into cognitive assessment procedures for early detection and management of AD.

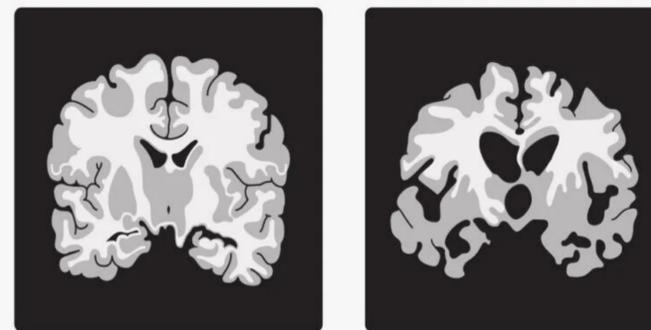
Methods

We conducted a meta-analysis on cognitive skills in Alzheimer's disease (AD) such as memory, spatial navigation, executive functions. We searched multiple databases, including APA PsycInfo, ProQuest, PubMed, and Dissertation and Thesis (Global) for articles and imported them into Covidence software for Stage 1, which is title and abstract screening. This research is currently in Stage 1, where we are conducting title and abstract screening using Covidence software to determine inclusion and exclusion criteria. Articles were included if they were a study, written in English, and focused on human participants, while we excluded those that were meta-analyses, literature reviews, book chapters, non-English studies, or studies on animals. During the review and screening process, two reviewers needed to agree, and if there was disagreement on an article's relevance, a third reviewer determined the final decision.



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Figure 1: Systematic Screening of Alzheimer's Research: PRISMA-Guided Abstract and Full-Text Analysis Using Covidence.



NORMAL BRAIN

ADVANCED ALZHEIMER'S

MEDICALNEWS TODAY

Figure 2: Comparing a Healthy Brain to an Alzheimer's Brain: Structural and Functional Differences

Expected Results

Based on earlier findings from the meta-analysis on spatial navigation in Alzheimer's disease (Kossowska-Kuhn et al., 2024), the evidence also indicates a new direction for future research: building diagnostic and progression models for AD that incorporate multiple predictors. This work is a first step toward a model-based framework that allows for the comparison of a range of potential AD predictors, including—but not limited to—spatial navigation, in order to identify which predictors most reliably signal the onset of AD and which independently contribute to its prediction. Additionally, meta-analytic structural equation modeling (MASEM) offers a powerful tool for investigating the relationships between different psychological constructs and the progression of AD.

Conclusion

This study explores whether cognitive tests can accurately predict Alzheimer's disease (AD) and aim to identify the most effective assessments for early, non-invasive diagnosis. Future research should enrich this meta-analysis by integrating biomarkers, which provide objective indicators of disease progression. Biomarkers such as cfRNA, neuro-exosomal proteins, and CSF markers (YKL-40, VILIP-1) have shown promise in enhancing early AD detection and supporting improved diagnostic tools for clinicians. While cognitive assessments are crucial, their reliability on individual tests varies, making meta-analysis essential for strengthening generalizability. The next step would be to combine the results of our meta-analysis, taking into consideration cognitive skills alongside biomarkers, as biomarkers provide objective physiological indicators of disease progression, possibly improving diagnostic accuracy and early intervention strategies for AD.

Resources

