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Detection of Alzheimer's Disease *via* Neuroimaging and Neuropsychology

Andrea Tales*

Department of Experimental Psychology, University of Bristol, Bristol, UK

***Corresponding author**: Andrea Tales, Department of Experimental Psychology, University of Bristol, Bristol, UK, E-mail: Andrea.Tales@bristol.ac.uk

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Editorial Note

Over five million Americans above the age of 65 are now living with Alzheimer's disease, and it's estimated that the condition will afflict more than 13 million people in the United States by 2050. Researchers have been reliant on neuroimaging brain scans such as Magnetic Resonance Imaging or Positron Emission Tomography to study Alzheimer's disease and other neurodegenerative disorders for the last three decades, yet these investigations are unable to find treatments or cures and have failed to produce consistent results. Studies of specific disorders or symptoms are assumed to implicate a particular brain region in neuroimaging. Neuropsychiatric and cognitive disorders could be better explained by brain networks than by single brain regions.

Recent research achieved remarkable sensitivity and specificity by combining brain imaging analysis with a neuropsychological assessment, concentrating on people who will develop the disease while eliminating false positives, and those who will remain stable. The biggest revelation of the findings of the study is the accuracy of the classification system. Although, the efficacy of neuroimaging and neuropsychology independently is constrained, the ability to attain such a high level of accuracy was due to the combination and analysis of the results from both techniques. Due to a lack of reliable protocols, Analysts are unable to diagnose this condition at an early stage. Thus, there is a risk of failing to identify when trying to diagnose the condition too early. Identifying sensitive and specific markers that can be used to accurately predict the eventual onset of more severe symptoms greatly lowers the ambiguity of early diagnosis. Therefore, two separate methodologies can be merged to aid in diagnosis, which is a significant advancement.

Alzheimer's disease researchers can build on this progress to make even more future improvements. The clinical advantages as a result of these methods are substantial; Neuroscientists can now test the efficacy of pharmacological and non-pharmacological therapies on the outcome of a clinical diagnosis of Alzheimer's disease and determine whether these therapies are more effective if administered earlier. Few drawbacks of the methodology include if the pharmacological treatment initiated at the commencement of early warning indicators would slow the illness and whether brain plasticity can be induced in a more structured manner to delay symptoms that cause impairment. This is a new way to combine results across many different studies to determine the brain circuit most tightly associated with a given symptom or disease.

The purpose of the research was to see if combining two different techniques for detecting incipient dementia in people with mild cognitive impairment could be beneficial. This predictive model determined which MCI patients were most likely to develop dementia compared to those who remained stable and assessments based on neuroimaging and cognitive measures both yielded more accurate predictions. The current findings also established a novel solution to the "Reproducibility crisis" in neuroscience; Reproducibility is the potential for different investigators to run the study again and obtain the same results. It is one of the main tenants of the scientific method and critical for translating research findings into treatments.