

Brain Activation Following a Leisure-Based Cognitive Intervention in Older Adults at Risk of Dementia: Results from the ENGAGE Study

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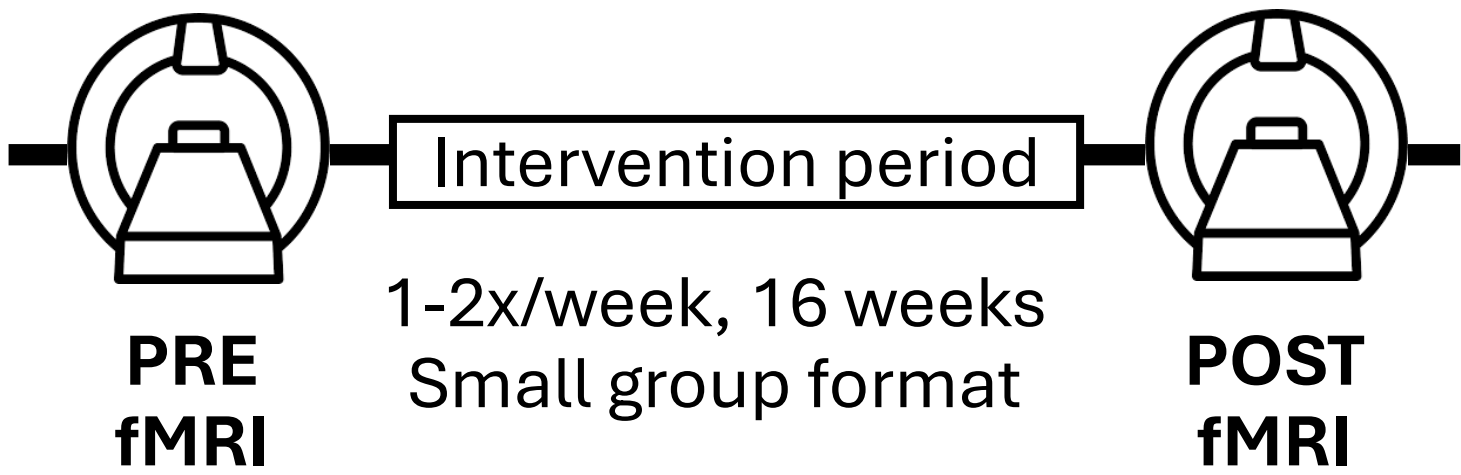
KEY TAKEAWAY: Leisure-based cognitive intervention increases activation in both memory-related regions (specialized) and new (alternative) regions involved in mental imagery and learning.

INTRODUCTION

- Cognitive interventions** have been shown to improve cognition in older adults at risk of dementia¹.
- However, the **neurofunctional mechanisms** underlying these effects remain insufficiently understood, and there is a need for more engaging intervention approaches.
- AIM:** To identify the functional activation correlates of an intervention combining traditional cognitive training with cognitively stimulating leisure activities, and to examine its effects on memory-related brain activation.

METHODS: The ENGAGE Study²

Double-blind randomized controlled preference trial in older adults with subjective cognitive decline (SCD) or early mild cognitive impairment (eMCI).



	ENGAGE-MUSIC/SPANISH	DISCOVERY (active control)
Formal training (17h)	Strategy-based cognitive training: memory and attention	Psychoeducation on cognitive aging
Leisure (35h)	Music OR Spanish lessons + strategy training + cognitively stimulating video games	Documentaries + discussion sessions + non-cognitively stimulating video games
Homework	Video games + exercises	Video games + exercises

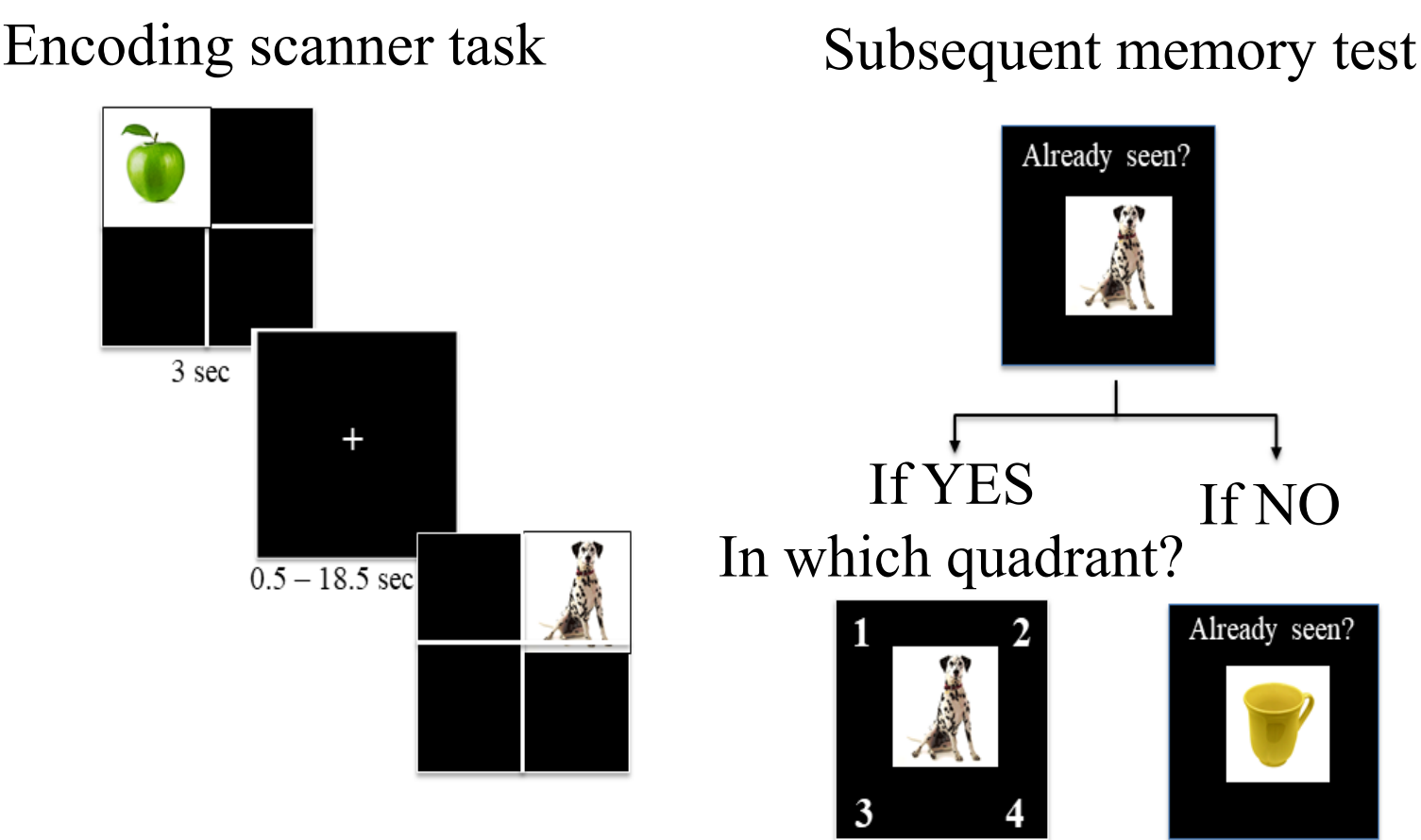
METHODS

Participant characteristics	ENGAGE-MUSIC/SPANISH	Discovery	p
N	24	12	
Sex (Women/Men)	17/7	9/3	0.792
Age	69.6 (5.2)	71.0 (6.9)	0.498
Years of education	14.5 (3.7)	16.2 (3.2)	0.181
MoCA	26.8 (2.4)	26.8 (1.8)	1.00

Values are mean (SD) unless otherwise indicated. P-values are derived from independent t-tests (continuous variables) and χ^2 (categorical variables).

Neuroimaging data acquisition

- 3T Siemens MAGNETOM Prisma Fit MRI scanner
- Task-based fMRI: object–location associative memory encoding task³
- Encoding: 78 images. Retrieval (out of scanner): 78 previously seen images + 39 new images.



fMRI contrast: Successfully encoded images (well recalled and positioned) > Control (grey squares)

Analyses by region-of-interest (ROI)

7 specialized regions

Regions previously shown to be active during the task⁴

5 alternative regions

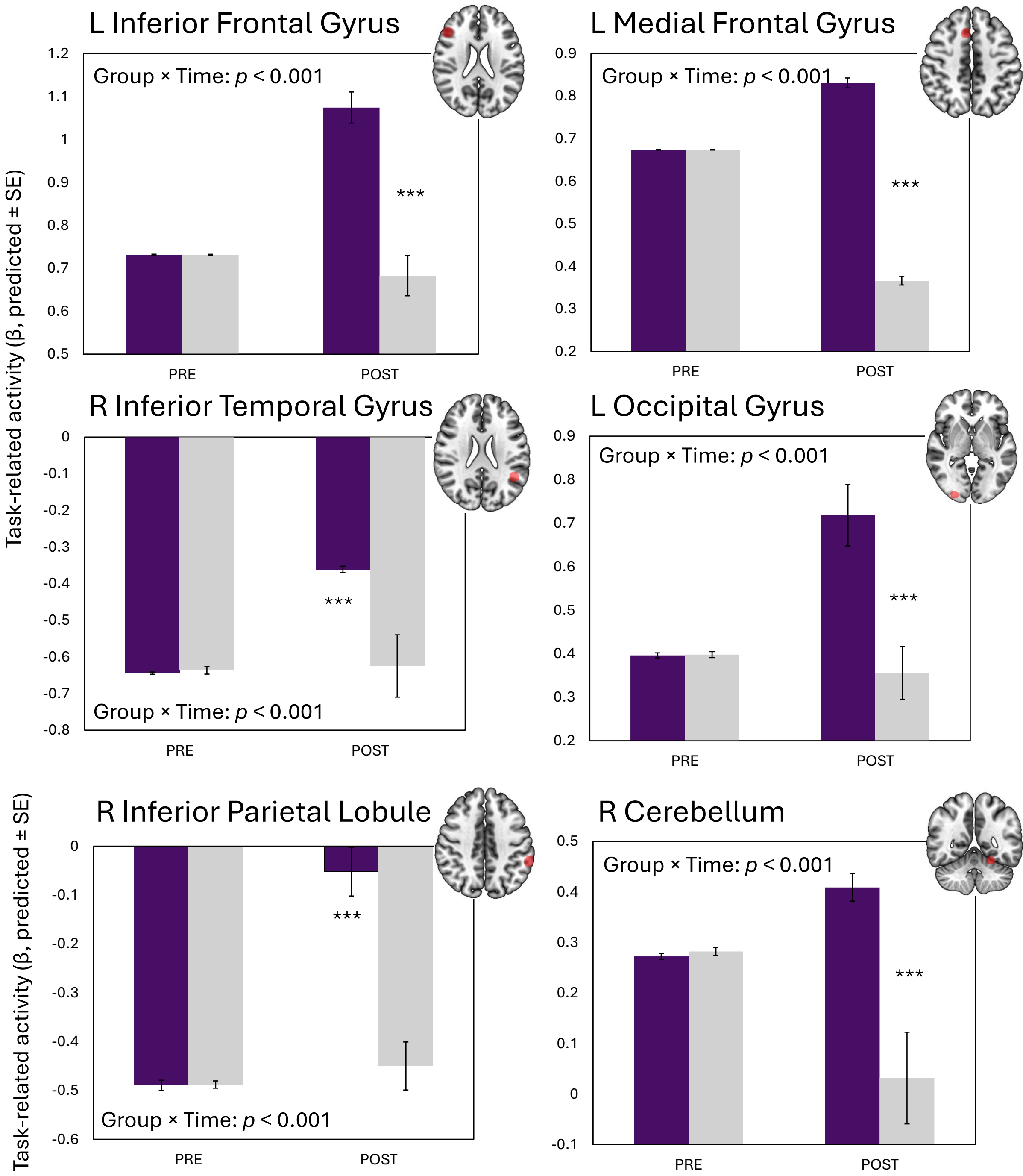
Regions not typically active during the task but shown to be newly recruited following a similar intervention⁵

RESULTS

Changes in fMRI task performance: No significant between-group differences were observed ($\Delta d'$ (Post-Pre)) (ENGAGE: -0.13 ± 0.5 ; Discovery: -0.38 ± 0.6 ; $p = .207$).

Groups: ENGAGE Discovery

Baseline-corrected ANOVAs were conducted on beta values extracted from 12 ROIs.



*** Indicates significantly greater activation in the ENGAGE-Music/Spanish group compared with the Discovery group at POST. No significant between-group differences were observed at PRE.

CONCLUSION

- The ENGAGE intervention led to functional changes not observed in the active control group (Discovery).
- These changes included increased activation in multiple specialized memory-related regions, suggesting enhanced engagement of these regions.
- Additional activation was observed in alternative regions consistent with trained strategies, such as mental imagery (parietal lobe), as well as regions associated with new learning and adaptation (cerebellum).

References



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