Virtual music therapy in mild cognitive impairment and Alzheimer's disease dementia

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Background

- Music therapy has shown promise in impacting brain activity associated with cognitive function and neuropsychiatric symptoms in elderly with dementia [1-3]

- *Virtual music therapy (VMT)* can increase access to care for participants living in rural areas or for whom travel is difficult, enabling participation in study interventions without disrupting daily routines [4-5]

- Despite the increased use of virtual music therapy due to COVID-19, the impact of virtual music therapy sessions on reminiscence/autobiographical memory is minimally explored in the literature.
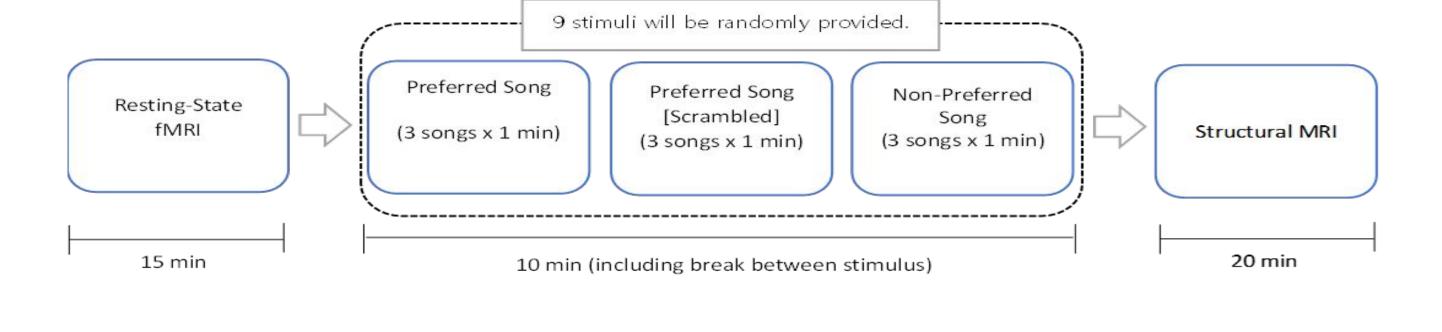
Study Purpose

To investigate the effectiveness of individualized VMT sessions for enhancing autobiographical memory and neuropsychiatric symptoms in individuals with mild cognitive impairment (MCI) and mild dementia due to Alzheimer's disease.

Methods

- **Study Protocol**
  - Visit 1 (Pre MRI scan and Neuropsychiatric symptom and emotional outcome assessments)
  - 16 VMT sessions (30 min, Twice a week for 8 weeks) designed to evoke memories and moods by certified music therapists
  - Visit 2 (Post MRI scan and Neuropsychiatric symptom and emotional outcome assessments)
- **fMRI scan protocol**

Results

- **Participants**: 5 participants
  (4 males, age=74.80±4.02, years since diagnosis=1.60±1.29)

	Pre	Post
MoCA	23.8 (4.31)	22.6 (4.56)
QoL_AD_Patient	40.2 (7.66)	39.0 (9.62)
QoL_AD_Family	41.6 (7.64)	41.2 (6.06)
STAI	44.6 (13.83)	37.8 (16.60)
Nostalgia	24.6 (7.09)	25.6 (13.16)
GDS	3.4 (3.05)	2.8 (3.27)

Table 1. Behavioral Outcomes in Pre and Post 16 virtual music therapy sessions

Note. Montreal Cognitive Assessment (MoCA); Quality of life_Alzheimer's disease (QoL_AD); State Trait Anxiety Inventory (STAI); Geriatric Depression Scale (GDS)

Music Listening fMRI GLM Analysis

a)

b)

Figure 1. a) Post[Familiar>unfamiliar] - Pre[familiar >unfamiliar] contrast for single participants. Red: more active after VMT sessions than before VMT to familiar songs relative to unfamiliar songs; Blue: more active after VMT sessions than before VMT sessions to unfamiliar songs relative to familiar songs; **b)** Unthresholded single subject z-maps were entered into a second level GLM. **Post[Familiar-unfamiliar] - Pre[familiar - unfamiliar]** group level contrast includes P01-4.
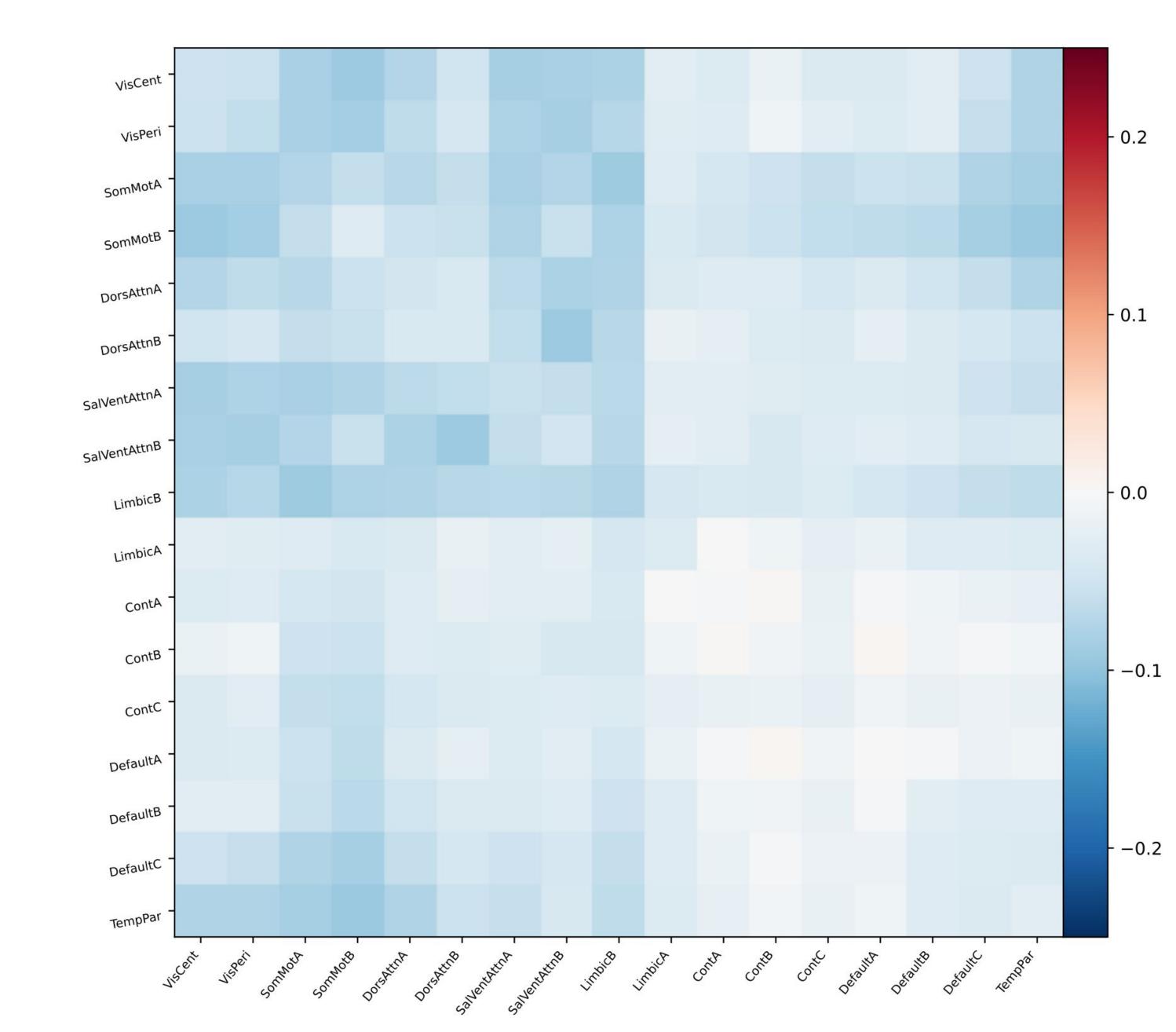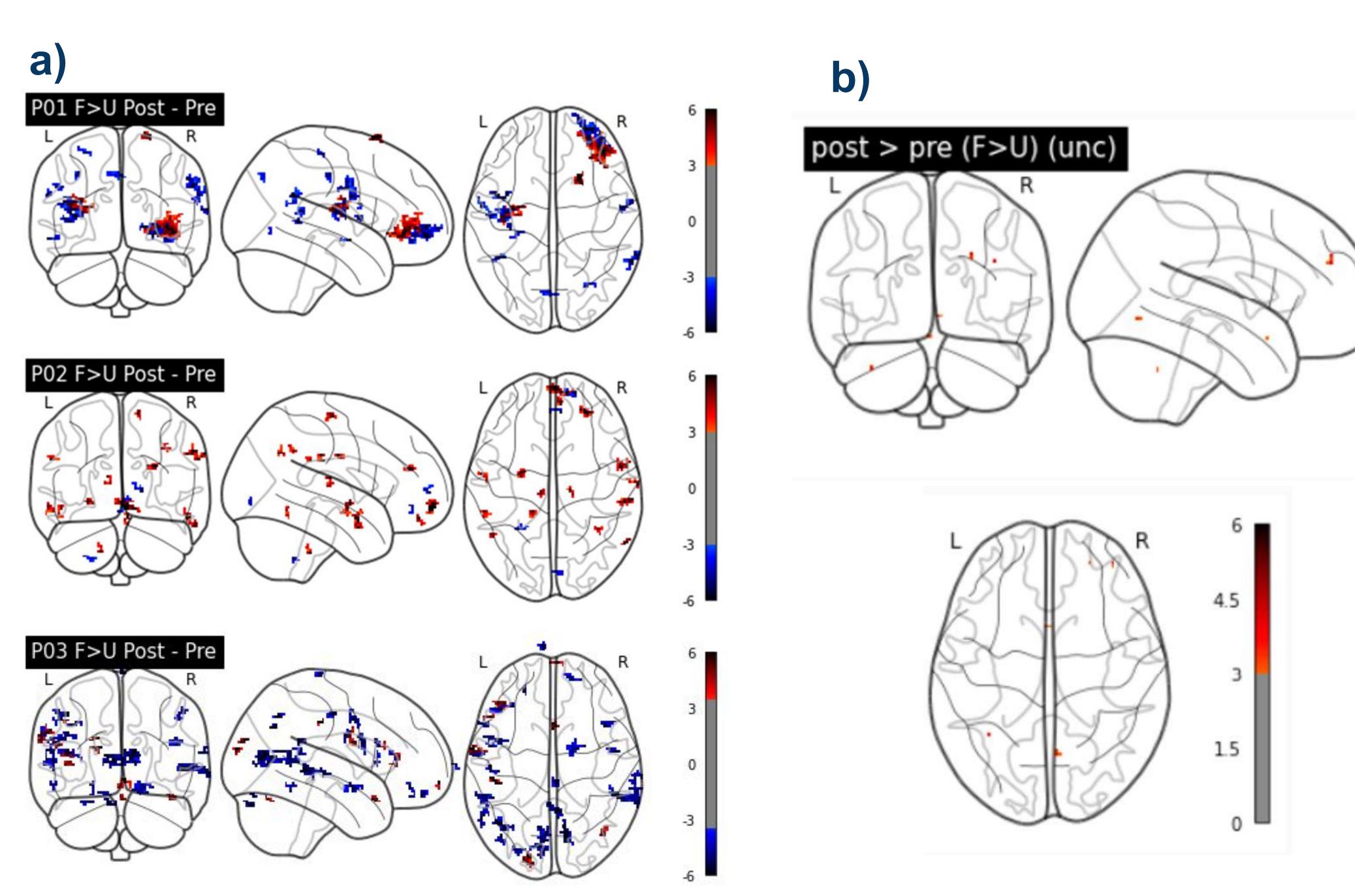
Resting State Functional Connectivity

Figure 2. Average change (post VMT - pre VMT) in within (diagonal cells) and between (off-diagonal) network connectivity for each of 17 resting-state functional networks defined by Yeo atlas. Resting state fMRI data from P01-P07 were used.

Conclusion

- Preliminary results suggest decreased anxiety and depression levels after 16 VMT.

- Further investigation of the correlation between music therapy approaches, behaviors, and brain activity is required (recruitment ongoing).

- Understanding the neural network impact and neuropsychiatric symptom changes of tailored VMT may inform future interventions and improve the overall well-being of patients with these conditions.

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