Neural Correlates of Music-Evoked Nostalgia Across the Lifespan

USC Dornsife
Brain & Creativity Institute

Sarah Hennessy[1], Petr Janata[2], Assal Habibi[1]

[1]Brain and Creativity Institute, University of Southern California, Los Angeles, CA, United States
[2]Center for Mind and Brain, University of California Davis, Davis, CA, United States

Introduction

- Music can *evoke* autobiographical memories and nostalgia
- Music-evoked memories can be accessible in individuals with Alzheimer's Disease and Related Dementias
- It is unclear whether *self-selected* music may be accompanied by more vivid autobiographical memories or stronger neural activation
- Neural correlates across the lifespan have not been explored

What is the functional neural mechanism of music-evoked nostalgia in younger and older adults?

Methods

Participants
- **N = 57** (**29** age 18-35, **28** age 60+), 46% female
- MRI eligible
- MoCA score > 26
- Not experiencing psychiatric symptoms

Procedures
1. Screening
2. Stimulus Selection
3. Subjective Appraisals
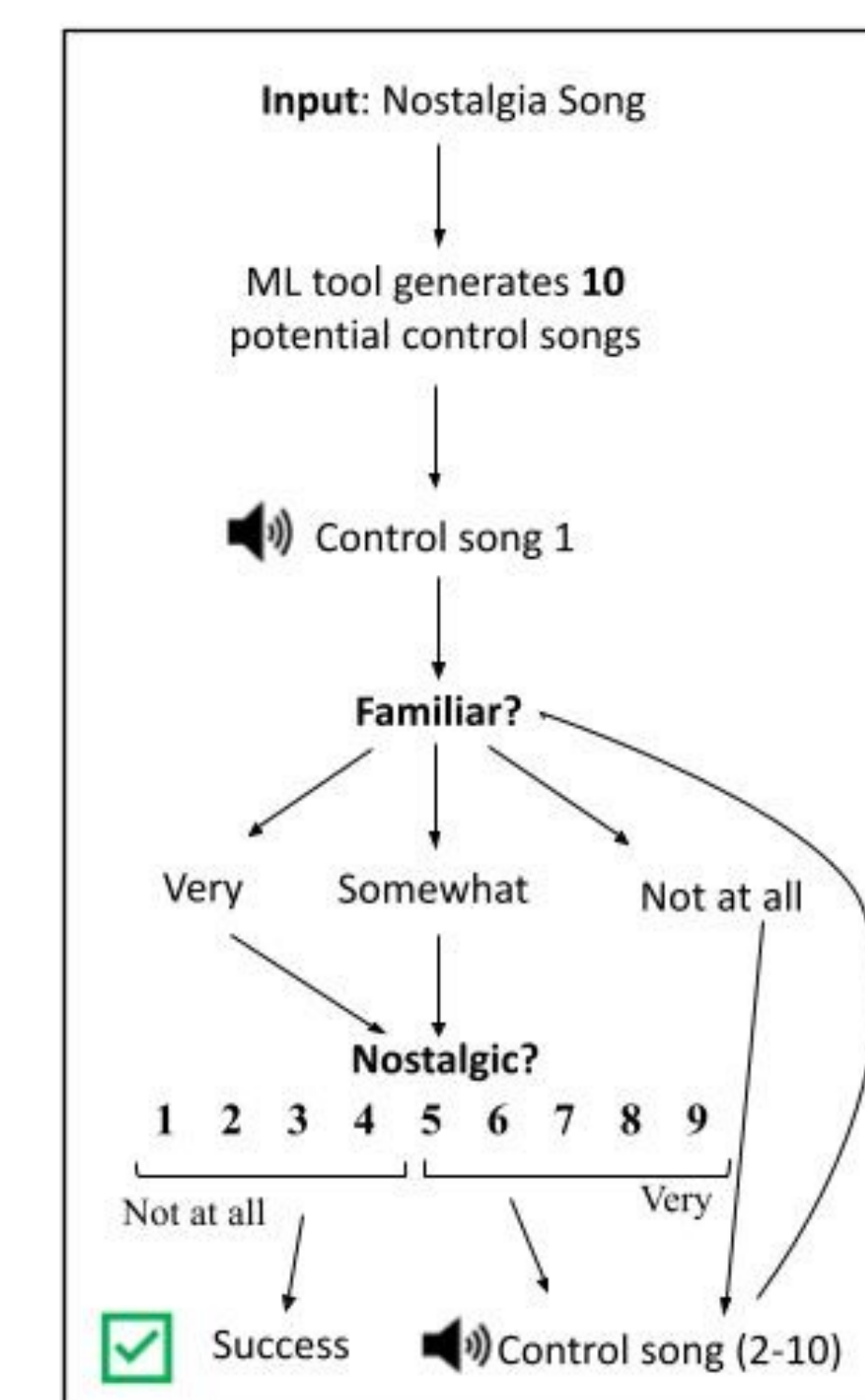4. 1-hr fMRI scan
5. Autobiographical memory task

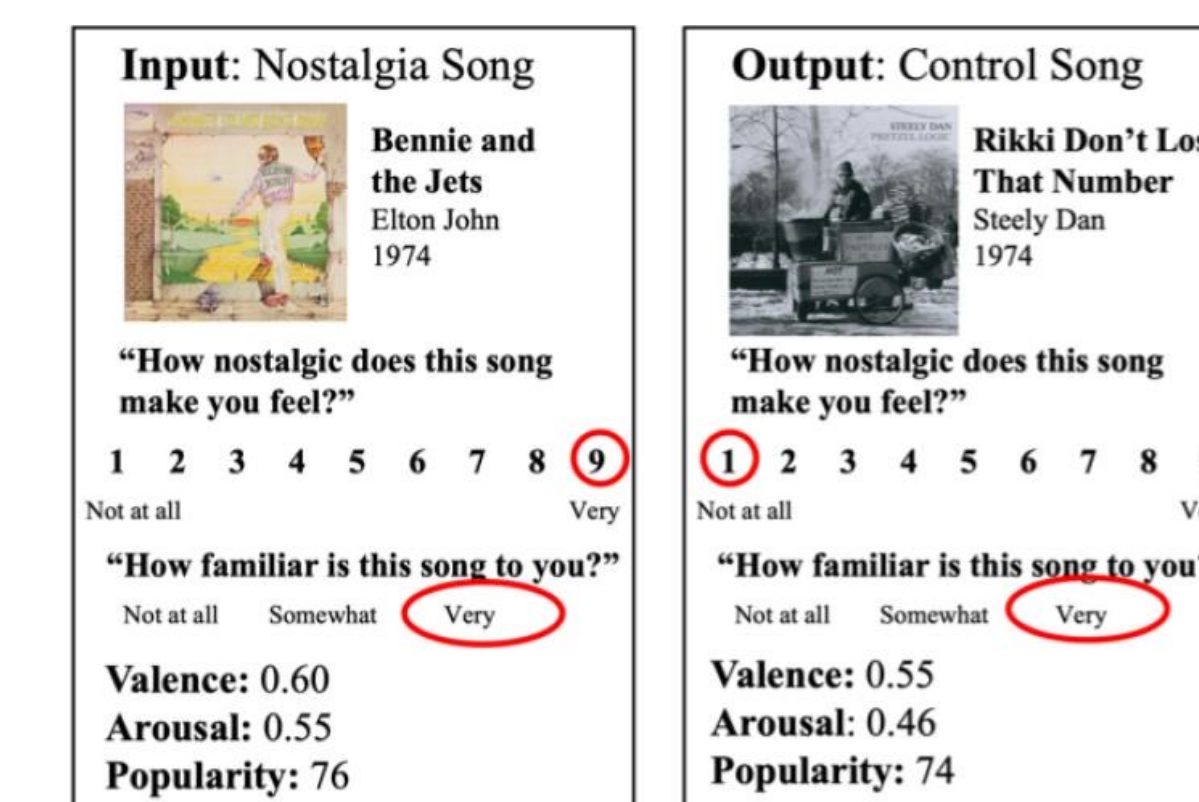Figure 1. Stimulus selection procedure

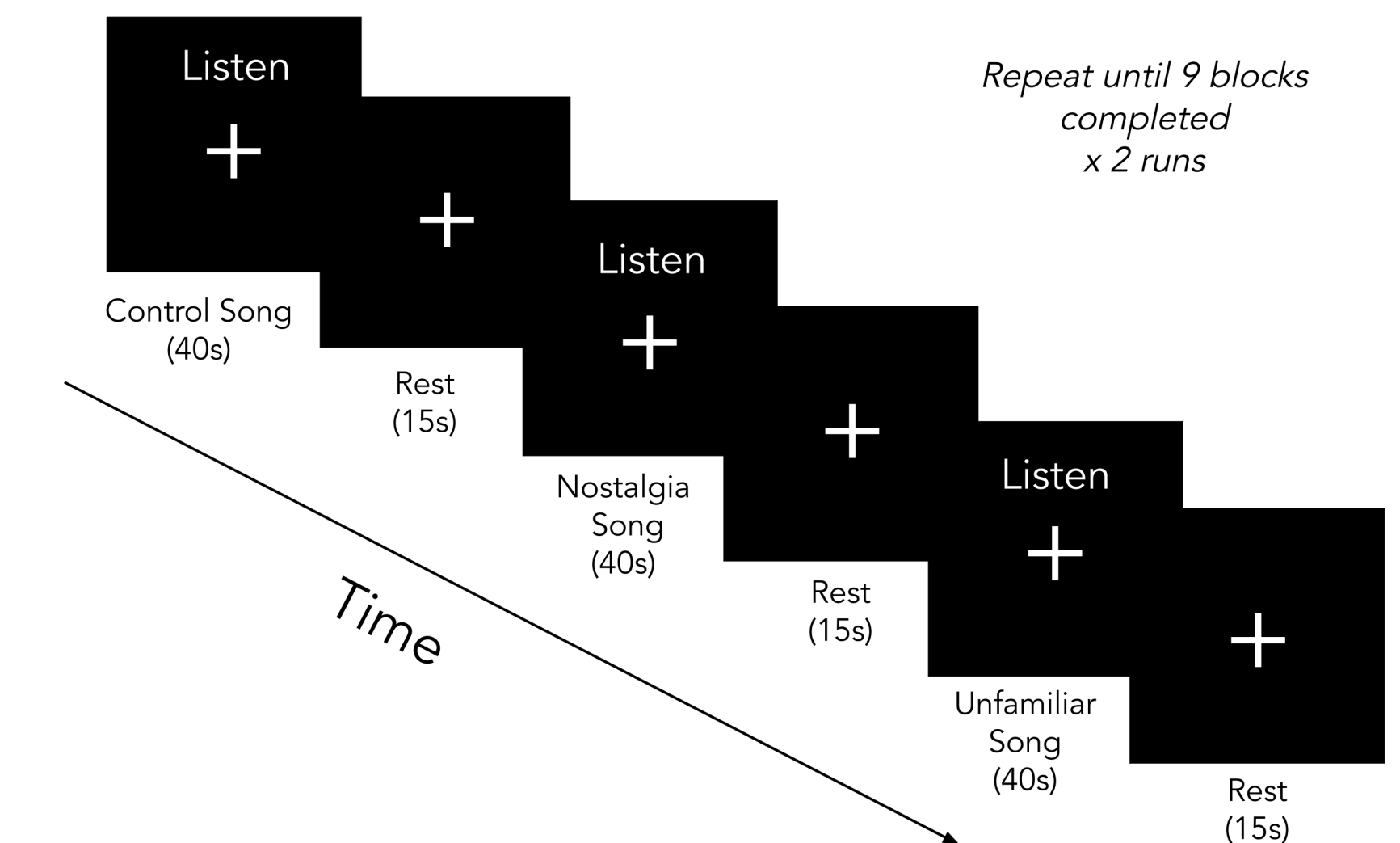Figure 2. Example Nostalgia and Control Stimuli

Figure 3. fMRI Protocol

Results

Whole Brain GLM Analysis

- In all participants, Nostalgia > Control contrast showed activity in the Default Mode Network (mPFC, vmPFC, PMC), reward regions (VTA, SN, caudate, putamen), medial temporal lobe, ACC, SMA/pre-SMA, insula, IFG (pars O), intracalcarine cortex, and cerebellum
- Nostalgia > Control showed no significant clusters
- Nostalgia > Unfamiliar showed above regions, in addition to widespread SFG

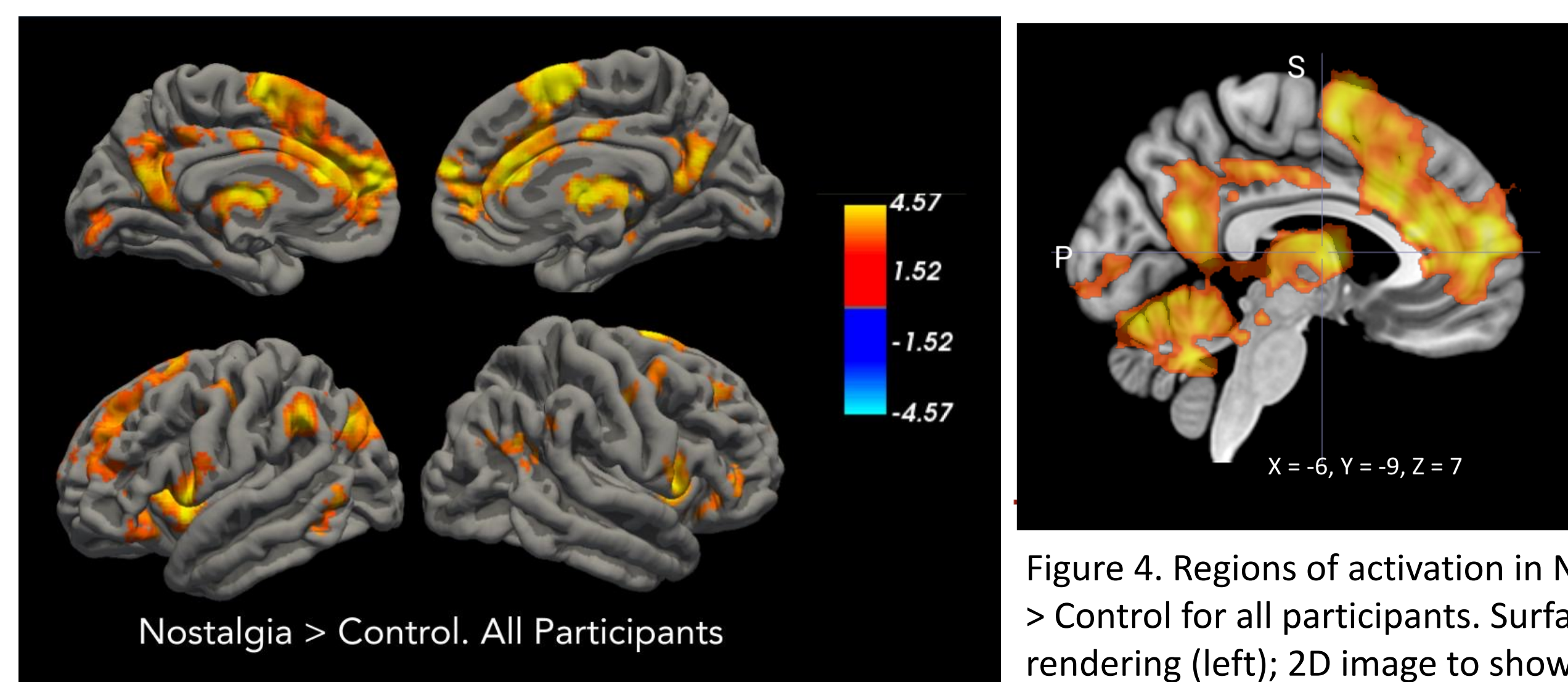
Nostalgia > Control. All Participants

Figure 4. Regions of activation in Nostalgia > Control for all participants. Surface rendering (left); 2D image to show subcortical, and cerebellar regions (right).

ROI analyses

- ROIs were selected a priori for their role in self-referential thought, memory, and reward
- L mPFC: Nostalgia > Control and Unfamiliar ($p < 0.01$, $p < 0.001$); R mPFC: Nostalgia > Control and Unfamiliar ($ps < 0.05$)
- R VTA: Nostalgia ~> Control ($p = 0.07$)
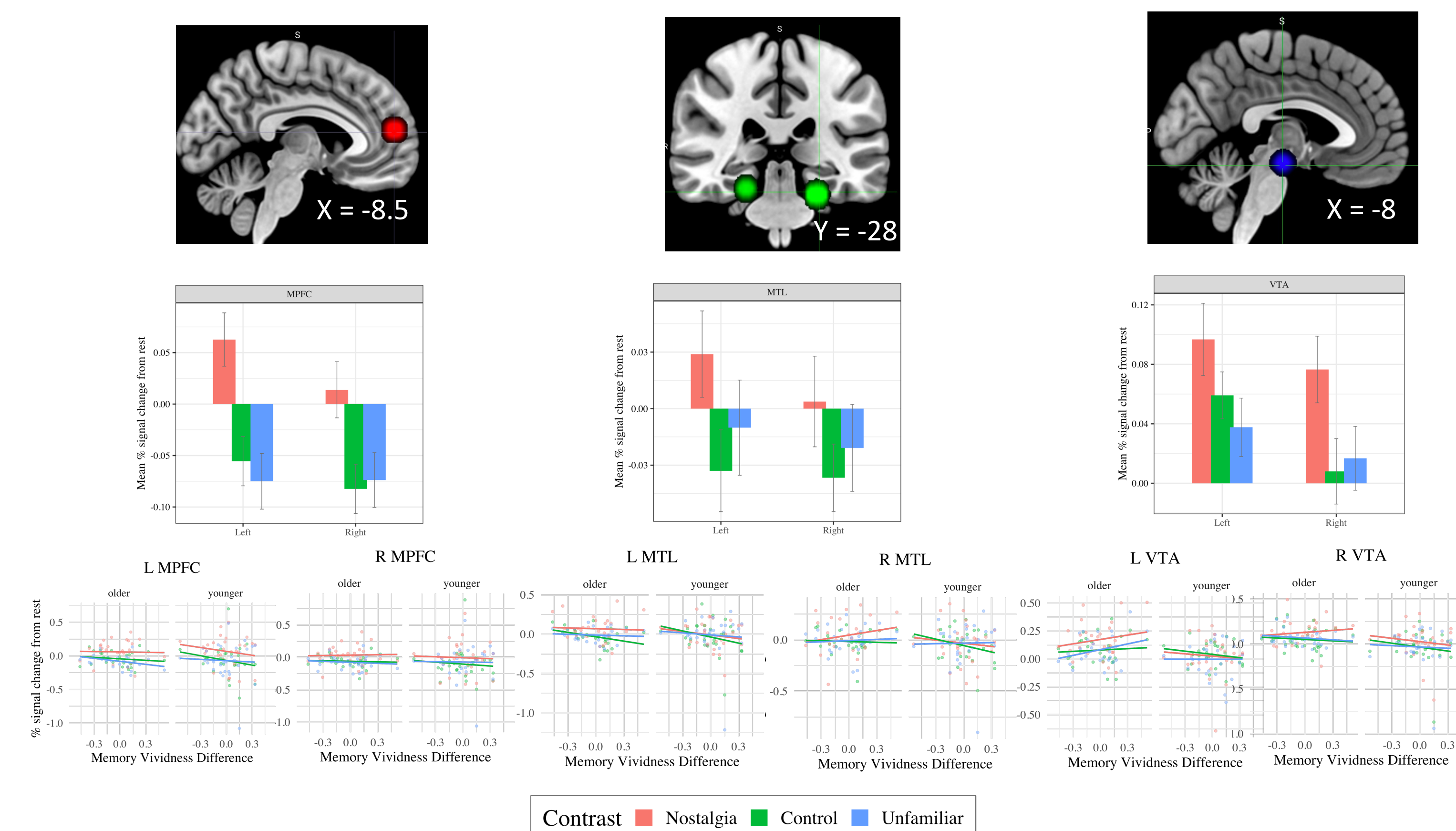
Conclusions

We observe that music-evoked nostalgia is associated with widespread activity across cortical and subcortical regions, including the default mode network, reward regions, and autobiographical memory network, as well as visual, pre-motor, and cerebellar regions.

- Observed activity outside of traditional memory networks (i.e., MTL) may help to explain why music may evoke memories in individuals with neurodegenerative diseases (ADRD)
- Further analysis will include investigation of differences between age groups, memory vividness, the interaction of personality and neural function, and functional connectivity analyses