

# Impact of a Lifestyle Intervention on Patterns and Predictors of Individual Differences in Cognitive Function for Persons with Dementia

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## Rationale

- Recent research has examined how music is beneficial for attenuating depressive symptoms and improving cognitive functioning. Specifically, social singing is shown to improve social agency,<sup>1</sup> mitigate psychosocial comorbidities,<sup>2</sup> and preserve cognitive function in individuals with Dementia.<sup>3</sup>
- Similar lifestyle interventions have found that music interventions improved cognitive functioning by engaging the areas of the brain that have not been severely impaired by the disease.<sup>3</sup>
- The present study aimed to further research on music-related lifestyle interventions that could assist in symptom reduction for People with Dementia (PwD), as well as examine the patterns and potential predictors of individual differences in cognitive function.
- We hypothesized that: (1) a music-based lifestyle intervention would protect against cognitive decline, and (2) within-person improvements in cognition for select occasions would be coupled with optimal values for predictors (e.g., reduced negative affect).

## Research Objectives

- To examine whether a **social cognitive lifestyle intervention** (i.e. social singing) can modulate patterns of cognitive change in PwD. Our primary objective is to **examine cognitive functioning** across multiple assessments to understand individual differences in rates of change.
- To explore patterns of **time-varying covariation** between within-person change in MMSE and potential **moderators** such as peak expiratory flow, episodic memory, gait velocity, and positive and negative affect.

## Methods

### Design

- PwD, along with their caregivers and students from local Victoria High schools, partook in the lifestyle intervention Voices in Motion.
- Participants engaged in a weekly intergenerational choir spanning three 3.5-month seasons over a total of 18 months.
- This study utilizes a longitudinal intensive repeated measures design where data on various measures of cognitive, psychological and physical health were collected at three to four time points over each season, yielding up to nine assessments per participant.

### Participants

- N= 33** (75% female; 98.6 % Caucasian)
- Aged 57- 98 (M= 77.4; SD = 10.5)
- Median MMSE score at intake = 24

## Measures

### Cognitive Measures

- Mini-mental State Examination** (Range of 0-30)<sup>4</sup>
  - Score of 20-24 = Mild cognitive impairment
  - Score of 12-20 = Moderate cognitive impairment
  - Score < 12 = Severe cognitive impairment

### Psychosocial Measure

- Positive and Negative Affect Schedule** (PANAS)<sup>5</sup>

### Biological Measures

- Gait Mapping using the **GAITRite®** computerized walkway<sup>6</sup>

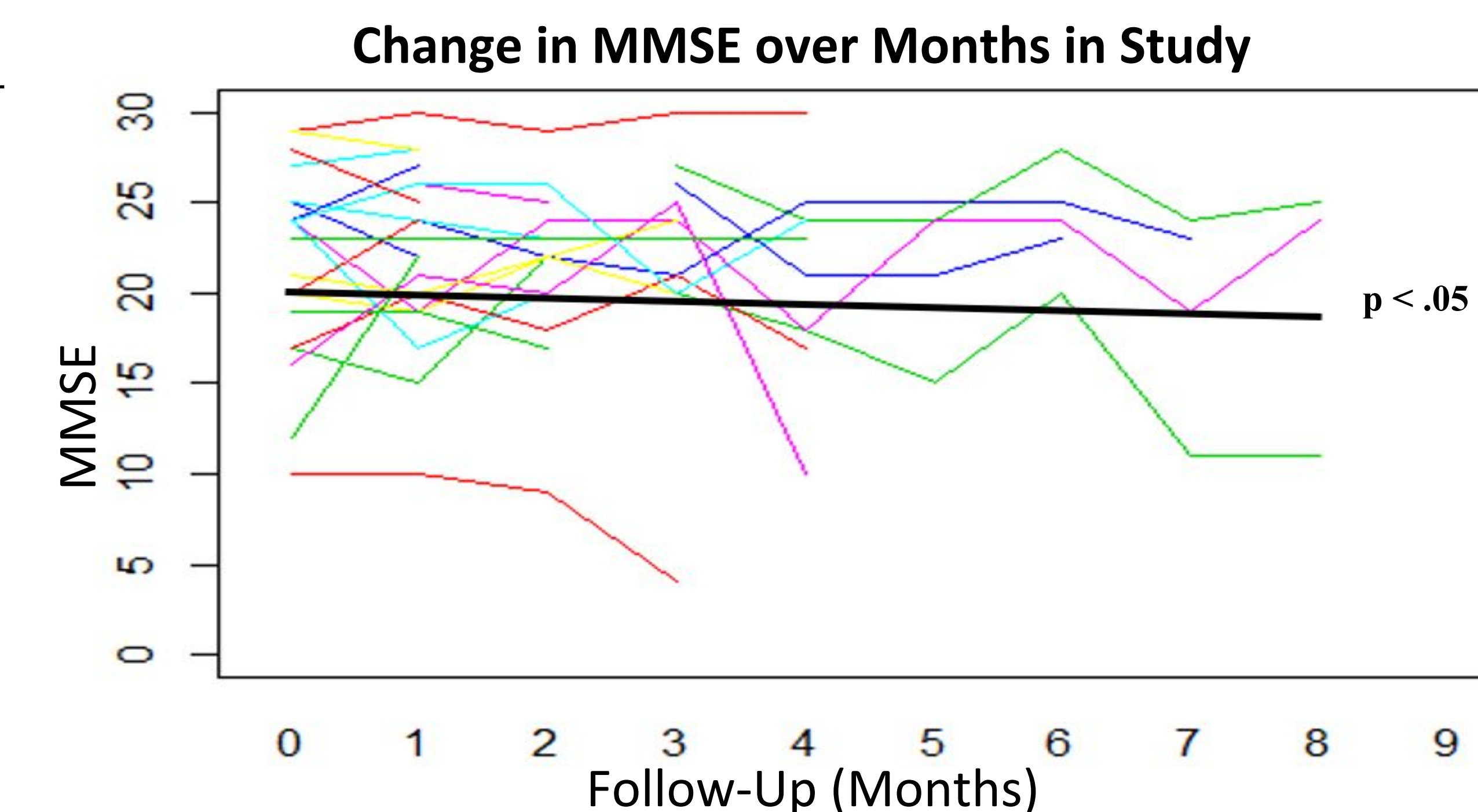
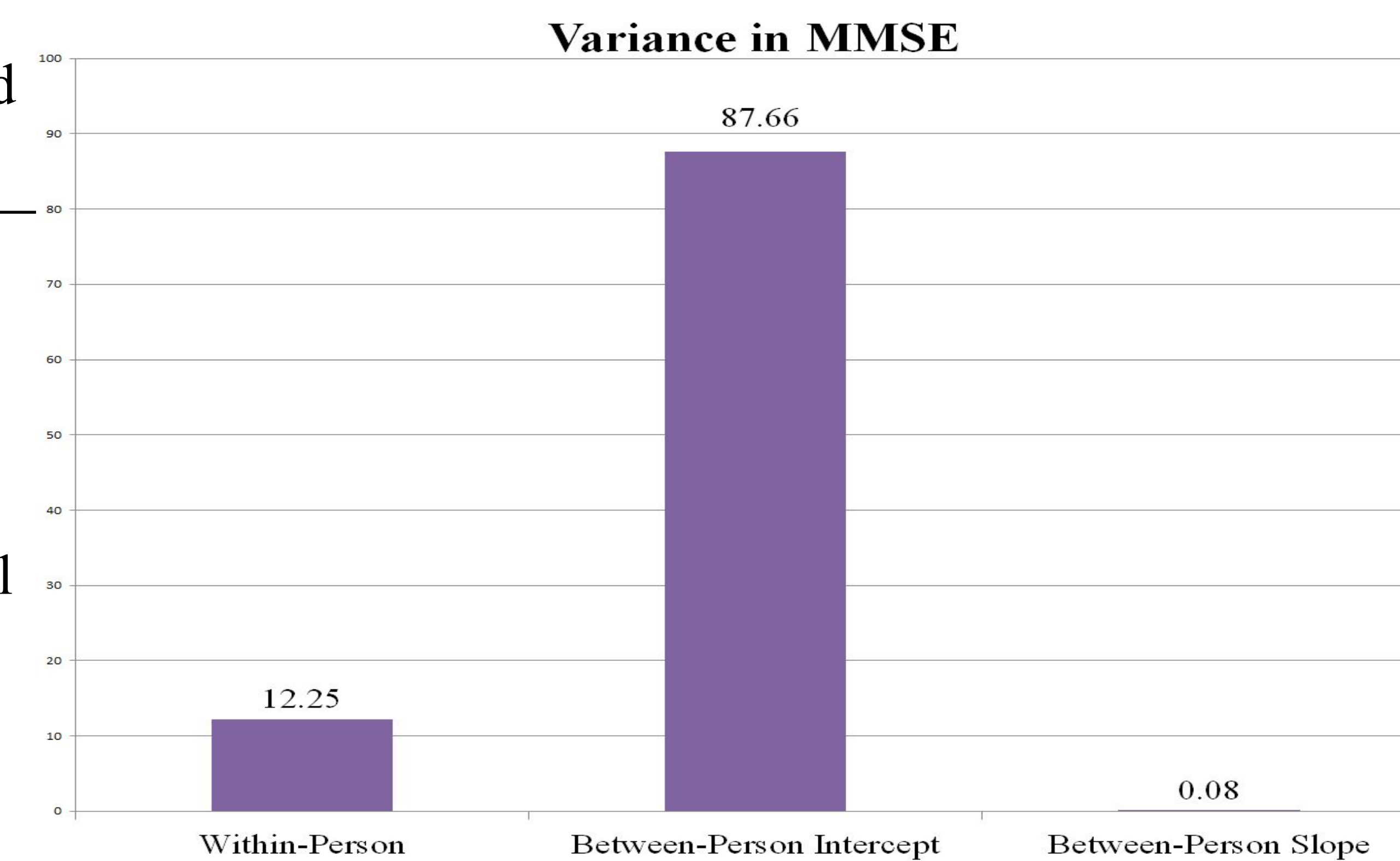
## Results

**Linear mixed models** were fit to examine within-person (Level 1) and between-person (Level 2) differences in cognitive functioning (indexed by **MMSE**) as a function of **time in study**:

$$MMSE_{ij} = \beta_{0i} + \beta_{1i} (\text{Time in Study}_{ij}) + e_{ij} \quad (\text{level-1})$$

$$\beta_{0i} = \gamma_{00} + \gamma_{01} (\text{Age}) + u_{0i} \quad (\text{level-2})$$

### Objective 1: Characterizing Change in MMSE



### Objective 2: Within-Person Predictors of Change

$$MMSE_{ij} = \beta_{0i} + \beta_{1i} (\text{Time in Study}_{ij}) + \beta_{2i} (\text{Negative Affect WP}^*) + e_{ij} \quad (\text{level-1})$$

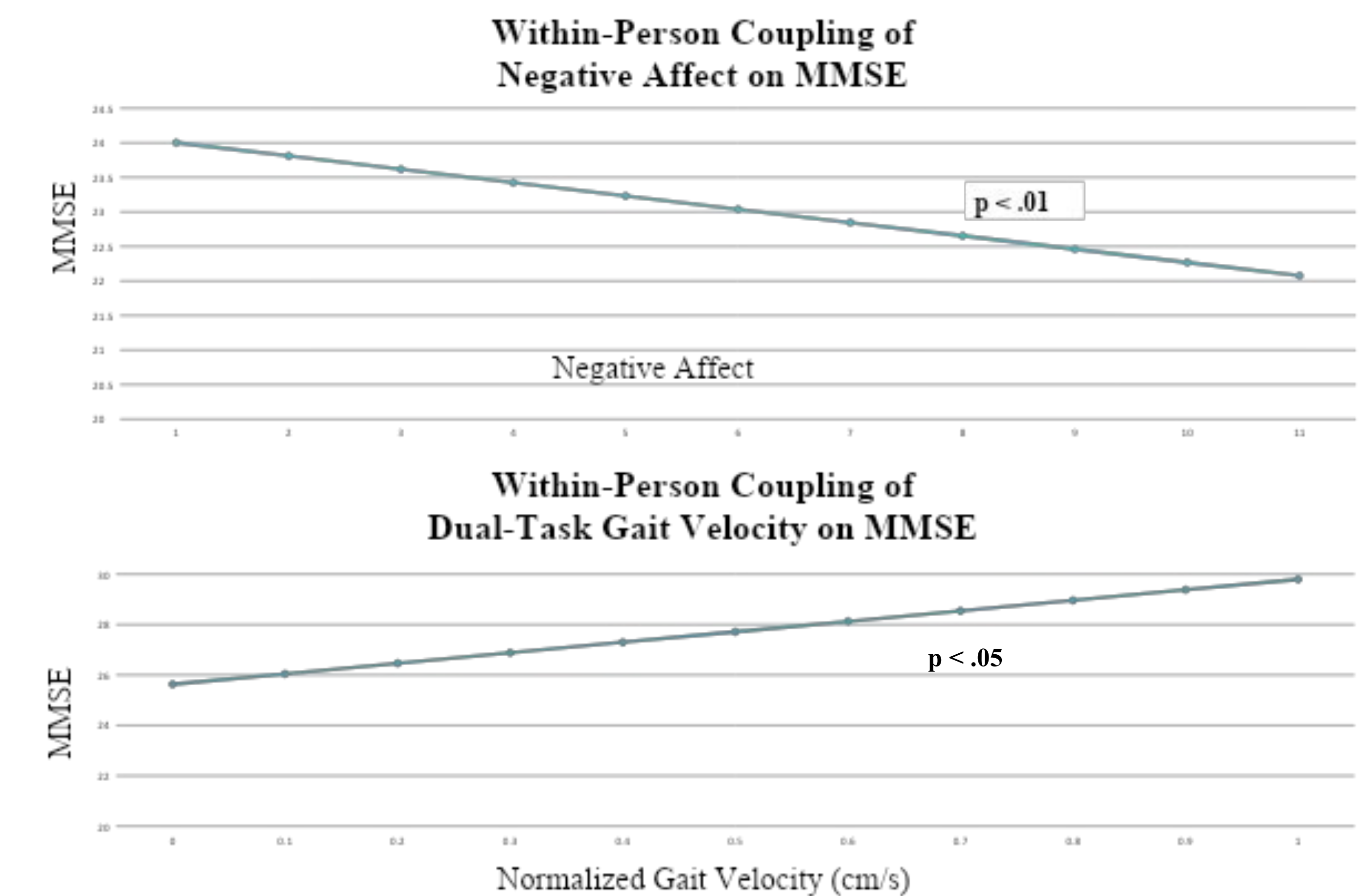
$$\beta_{0i} = \gamma_{00} + \gamma_{01} (\text{Age}^{**}) + \gamma_{02} (\text{Negative Affect BP}) + u_{0i} \quad (\text{level-2})$$

$$\beta_{1i} = \gamma_{10}$$

$$\beta_{2i} = \gamma_{20}$$

\* Person-Mean Centered

\*\*Centered at Age 75



## Conclusions

- Results indicated that participants were declining in cognitive function at **similar rates** across the intervention. Prior research on individuals with Alzheimer's disease demonstrated an annual 3.2 unit decrease in MMSE scores.<sup>7</sup> However, individuals in our intervention experienced only a 1.9 unit annual decrease in MMSE scores, implying that the intervention was successful in **slowing the progression of dementia symptoms**.
- Coupling models demonstrated **significant within-person effects** for both negative affect (psychosocial) and gait dual task (biological) measures. These associations were likely a result of the intervention, as increasing socialization has been demonstrated to decrease depressive affect, and as a result, to increase cognitive functioning.

### Limitations

- Despite the small sample size, the nuanced intensive repeated measures design provided up to 9 assessments for any given individual. The observed significant associations likely underestimate the true magnitude of effects.
- Due to the nature of our experiment, we were unable to randomize participants and thus lacked a conventional control group, but due to the novel design, participants were able to serve as their own controls.

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