



An Integrative Group Movement Program (PLIÉ) Improves Cognitive and Brain Function in Individuals with Mild Cognitive Impairment: results from a pilot clinical trial

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BACKGROUND

- **Alzheimer's Disease and Related Dementias (ADRD)**: a major burden for families & society
- No effective medication
- Non-pharmaceutical therapeutic options are needed
- **Preventing Loss of Independence through Exercise (PLIÉ)**: integrative group movement program focusing on procedural memory for basic functional movements, facilitating bodily awareness, and social connection.

OBJECTIVE

Pilot single-arm trial investigating PLIÉ's effects on MRI brain function in older adults with mild cognitive impairment (MCI).

METHODS

Participants: seniors $\geq 55y$ with MCI diagnosis or subjective memory complaints: MoCA = 18-26 (Montreal Cognitive Assessment)

Intervention: PLIÉ classes 2x/week for 12 weeks
Study Site: San Francisco VA Medical Center

Objective Co-Primary Outcomes: 1) pre and post resting state rs-fMRI in 3-Tesla scanner.
2) ADAS-cog Alzheimer's Disease Assessment Scale - cognitive subscale.

Secondary Outcomes:

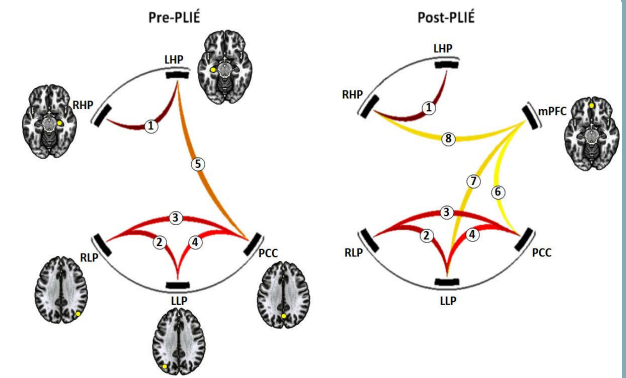
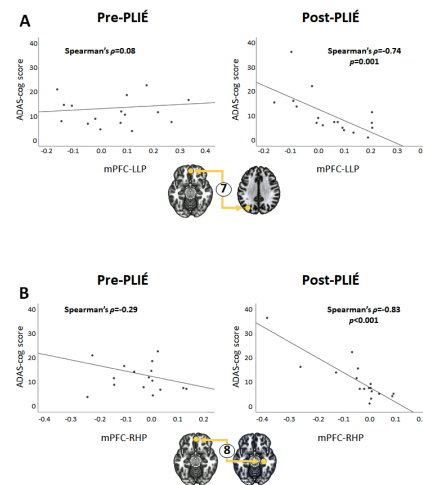
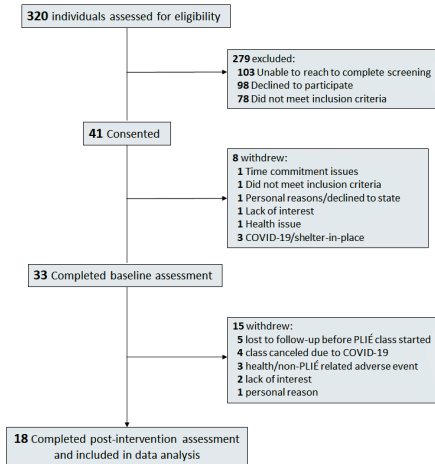
Objective: physical performance: Short Physical Performance Battery

Self-Report Questionnaires: Neuro-QOL Positive Affect and Well-Being, Geriatric Depression Scale, Quality of Life in Alzheimer's Disease, PROMIS Social Isolation, Neuro QOL Mobility, Multidimensional Assessment of Interoceptive Awareness (MAIA) Self-Regulation and Attention Regulation.

Analyses: 1) fMRI of Default Mode Network + connectivity with hippocampus using CONN, FDR and Spearman's correlation with ADAS-cog; 2) hippocampal subfield volumes using FreeSurfer. 3) paired *t*-tests. 4) Behavioral tests by Wilcoxon signed-rank test. Standardized ES.

RESULTS

- **18 participants** completed the pre-post intervention pilot trial. mean age 75.6 (SD 9.1); 11 male/ 7 female; 16 white, 9 veterans, baseline MoCA 24.2 (scale range 0-30; SD 2.0)
- Significant post-PLIÉ improvements in primary outcomes - **cognition** (ADAS-cog, standardized ES=0.34, $p=0.002$), mostly from immediate and delayed word recall
- **functional connectivity** within the brain's **default mode network (DMN)**.
- Improved ADAS-cog scores were significantly **correlated** with increased **DMN connectivity** between
 - medial prefrontal cortex [MPFC] - left lateral parietal cortex [LLP]: Spearman's $\rho=-0.74$, $p=0.001$;
 - MPFC - right hippocampus [RHP]: Spearman's $\rho=-0.83$, $p=0.001$.
- Reductions in **social isolation** (ES=0.62, $p=0.02$);
- Improvements in **interoceptive self-regulation** (ES=0.55, $p=0.005$)
- Improved **positive affect and well-being** (ES=0.55, $p=0.03$); and
- **Trends** for increases in total hippocampal 6322→6369, CA4 492→497 and dentate gyrus 548→555 volumes (mm^3)($p=.07$; .08; .05) interoceptive attention regulation (ES=0.46; $p=0.07$), depression (ES=0.26; $p=0.11$), quality of life (ES=0.26; $p=0.08$), and physical performance (ES=0.36; $p=0.06$).



CONCLUSION:

These preliminary findings of post-PLIÉ improvements in DMN functional connectivity, cognitive function, interoceptive self-regulation, and social isolation warrant larger randomized, controlled trials.