

Effects of a Hand Sensorimotor Program on Higher-Level Cognitive Domains in Older Adults with Mild Cognitive Impairment: A Pilot Study



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A structured hand sensorimotor program may support executive function, processing speed, and bimanual coordination in older adults with MCI, reflecting the potential value of tactile and dexterity-based activities for sensorimotor–cognitive engagement.

INTRODUCTION

RESULTS

- Hand dexterity bidirectionally associates with higher-level cognition [1], while tactile sensation moderates this relationship among older adults with and without MCI [2], shaping how sensorimotor inputs relate to cognition.
- In MCI, executive function and processing speed often decline, despite preserved daily independence.
- This study examined the effects of a hand sensorimotor program on higher-level cognition and hand sensorimotor abilities in older adults with MCI.**

METHODS

- Design:** Single-arm intervention
- Subjects:** 11 community-dwelling older adults with MCI
- MCI criteria:** MMSE≥24 & MoCA≤25

Hand sensorimotor tests



Tactile sensation
(Semmes-Weinstein monofilaments)



Hand dexterity
(Purdue Pegboard test, PPT)

Higher-level cognitive tests:

Executive function: Trail Making Test-Part B (TMT-B), Letter Fluency Test (LFT)

Processing Speed: TMT-A, Digit Symbol, Category Fluency Test (CFT)

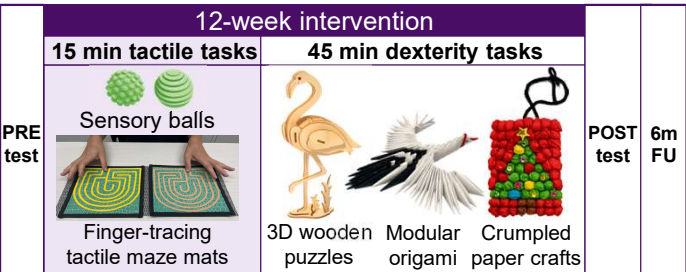
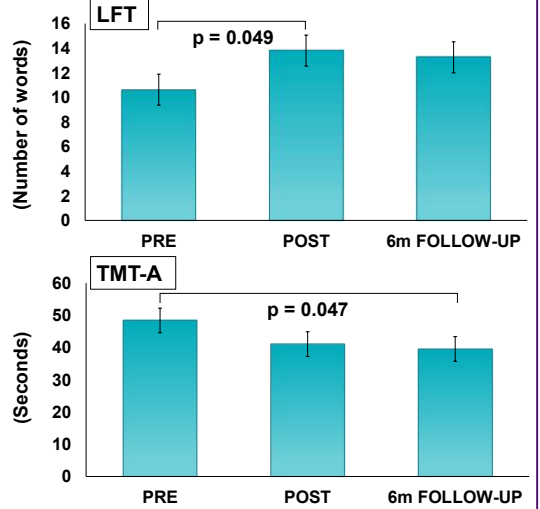


Fig. 1. Intervention program with unimanual/bimanual tactile and dexterity tasks.

Table 1. Descriptive characteristics and sensorimotor/cognitive test scores (n=11)				
Female, n (%)	8 (72.7)	Mean PPT_right hand (SD)	12.6 (1.8)	
Mean age (SD)	76.8 (6.2)	Mean PPT_bimanual (SD)	9.3 (1.4)	
Education (≥13y), n (%)	8 (72.7)	Mean PPT_assembly (SD)	24.0 (3.7)	
GDS (≥5), n (%)	2 (18.2)	Mean tactile sensation	3.0 (0.4)	
TMIG-IC	11.4 (1.7)	Mean TMT-A	48.5 (13.2)	
		Mean LFT	10.6 (2.9)	

GDS = Geriatric depression scale, TMIG-IC = Tokyo Metropolitan Institute of Gerontology Index of Competence, PPT = Purdue Pegboard test (number of pegs)

Higher-level cognitive function



Hand motor function

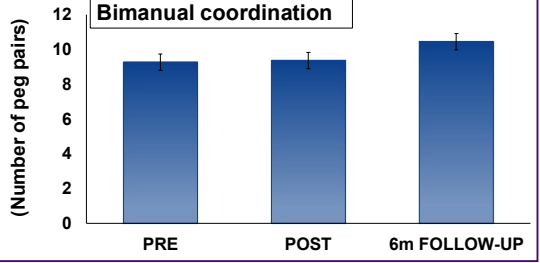


Fig. 2. Cognitive and hand motor outcomes across PRE, POST, and 6-month follow-up. LFT and TMT-A showed significant Time effects; LFT improved PRE→POST & TMT-A improved PRE→6m. Bimanual coordination also showed a significant Time effect.



Fig. 3. A hand dexterity activity (modular origami)

CONCLUSIONS

- Structured tactile and dexterous activities engaged hand sensorimotor processes in older adults with MCI, with modest cognitive gains.
- Bimanual coordination improved gradually, indicating benefits for sensorimotor-cognitive engagement in MCI.

REFERENCES

[1] Kobayashi-Cuya, K. E. et al. (2024). Archives of Gerontology and Geriatrics, 117, 105232.

[2] Kobayashi-Cuya, K. E. et al. (2026). Frontiers in Aging Neuroscience

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