

# Evaluation of the Effectiveness of *ImproveCog*: A Cognitive Stimulation Program for People with Mild Cognitive Impairment and Dementia

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## Introduction

Aging is associated with an increased incidence of neurodegenerative diseases, and it is essential to invest in effective approaches to deal with cognitive, emotional, functional, and behavioral deterioration, while also promoting a better quality of life. Cognitive stimulation is a powerful tool to deal with cognitive and executive decline, recommended since 2006 for all individuals with dementia by the National Institute for Health and Clinical Excellence (NICE). We developed the *ImproveCog*, a cognitive stimulation program adapted to the Portuguese reality, designed for people with Mild Cognitive Impairment (MCI) and Dementia. **In this study we aimed to evaluate its effectiveness in terms of global cognition, memory, executive functioning, emotional state, functionality, and quality of life.**

## Method

### Participants

Ninety participants with MCI and mild to moderate Dementia (61 females and 29 males), aged between 50 and 89 years old ( $M = 69.06$ ,  $SD = 9.20$ ), with a mean of 5.3 years of education ( $SD = 2.27$ ), participated in the study and were organized in two groups matched in sex, age and education: the experimental group ( $n = 57$ ; MCI = 46, Dementia = 11) who participated in the *ImproveCog*, and the control group who did not participate ( $n = 33$ ; MCI = 29, Dementia = 4).

- Diagnosis were made by an expert neurologist and/or psychiatrist.
- All participants were recruited in Hospital Pedro Hispano.
- The ethics committee approved the study and written informed consent was obtained according to the Declaration of Helsinki.

### Neuropsychological Protocol

- **Screening:** MoCA; INECO Frontal Screening, IFS; HADS; Disability Assessment for Dementia, DAD (functional status).
- **Memory:** VMS-III: Logical Memory I and II; Visual Reproduction I and II.
- **Attention:** VMS-III: Mental Control.
- **Visuospatial processing:** WAIS-III: Block Design.
- **Executive Functions:** Verbal Fluency (semantic and phonological).
- **Quality of Life:** QoL-AD (Dementia); WHOQOL-Bref (MCI).
- Questionnaires completed by participants, caregivers and group facilitators.

### *ImproveCog*

The *ImproveCog* consists of 12 weekly thematic group sessions lasting 1h30, and a manual with 264 "paper and pencil" cognitive training exercises to be performed at home (Meireles & Vicente, 2021).

- **Thematic sessions:** Childhood & Family; Sounds; Current affairs & Imagination; Faces/Scenes; Basic functionality; Associated words; Categorizing objects; Orientation & Planning; Instrumental functionality; Emotions; Numbers and letters games; Quiz.
- Sessions delivered by two facilitators to groups of 6 to 8 people with MCI and dementia.
- Exercises designed to be individually performed at-home between the group sessions (24 per week).

The performance of the two groups was compared at three time points: pre and post intervention (T1 & T2), as well as three months later (T3). All participants were assessed by a blind evaluator. The study was implemented in a hospital context.

## Results & Discussion

Measures	Experimental Group				Control Group			
	T1	T2	T3	p	T1	T2	T3	p
	M (SD)	M (SD)	M (SD)		M (SD)	M (SD)	M (SD)	
MoCA	15.0 (5.1)	15.9 (5.5)	17.0 (6.4)	<i>*ns/*</i>	14.2 (6.2)	12.4 (6.7)	13.0 (7.1)	<i>*ns/*</i>
IFS	9.5 (5.1)	12.1 (5.9)	12.8 (6.3)	<i>*ns/*</i>	11.4 (5.7)	9.8 (6.3)	9.9 (6.4)	<i>*ns/*</i>
VMS-III								
Logical Memory I	22.2 (12.7)	24.4 (14.3)	28.3 (16.4)	<i>**/*</i>	23.9 (13.2)	21.1 (14.4)	23.7 (16.6)	<i>*ns/*</i>
Logical Memory II	11.5 (9.7)	13.0 (10.8)	16.2 (12.8)	<i>**/*</i>	13.6 (10.3)	11.0 (9.6)	12.5 (10.5)	<i>*ns/ns</i>
Visual Reproduction I	30.3 (18.6)	43.0 (23.9)	41.4 (26.6)	<i>*ns/*</i>	37.8 (25.1)	28.3 (23.4)	26.6 (23.9)	<i>*ns/*</i>
Visual Reproduction II	8.3 (9.9)	19.2 (18.4)	23.6 (19.6)	<i>*ns/*</i>	10.8 (16.4)	10.9 (15.2)	10.6 (16.7)	<i>ns/ns/ns</i>
Visual Reprod. II-copy	76.5 (15.8)	91.7 (13.4)	88.9 (16.2)	<i>**/*</i>	81.7 (18.7)	66.0 (23.4)	67.8 (22.0)	<i>**/*</i>
Mental Control	13.0 (3.7)	16.2 (5.0)	15.9 (4.7)	<i>*ns/*</i>	14.5 (4.5)	13.3 (3.9)	11.5 (3.7)	<i>**/*</i>
WAIS-III Block Design	16.1 (7.1)	16.1 (6.9)	16.3 (6.2)	<i>ns/ns/ns</i>	15.7 (9.0)	15.4 (9.6)	14.5 (8.4)	<i>ns/ns/ns</i>
Verbal Fluency- F	11.6 (6.0)	18.3 (8.2)	18.8 (9.2)	<i>*ns/*</i>	15.3 (7.6)	12.9 (7.3)	11.0 (7.0)	<i>**/*</i>
Verbal Fluency- S	9.6 (4.3)	11.2 (4.6)	11.2 (4.4)	<i>*ns/*</i>	10.6 (5.0)	9.3 (5.0)	8.3 (4.2)	<i>*ns/*</i>
HADS	18.2 (9.7)	17.7 (9.2)	17.5 (9.12)	<i>ns/ns/ns</i>	22.2 (9.9)	22.3 (10.9)	21.7 (10.3)	<i>ns/ns/ns</i>
WHOQOL-Bref	47.0 (18.9)	49.7 (20.2)	52.0 (19.8)	<i>ns/ns/*</i>	50.9 (20.7)	47.6 (21.3)	45.8 (18.0)	<i>ns/ns/ns</i>
ADL (%)	32.4 (12.2)	54.0 (13.3)	58.0 (13.0)	<i>*ns/*</i>	15.6 (5.1)	42.0 (8.3)	24.0 (13.3)	<i>*ns/ns</i>

The results showed a significant impact of the *ImproveCog* in terms of global cognition, memory, attention, executive skills, functionality, and quality of life, which tends to remain 3 months after the program. In general, it was observed a significant increase in performance from T1 to T2 in the Experimental group and a decline in performance in the Control group.

**Conclusion:** *ImproveCog* appears to be a useful and valid cognitive stimulation program for use in clinical settings with these neurological populations. The study highlights the effectiveness of this type of intervention to delay cognitive decline in neurocognitive disorders and suggest its potential as a form of prevention in healthy elderly.

### Time X Group interactions:

- Global Cognition (MoCA): ( $F(2, 144) = 11.75$ ,  $p = 0.00$ ,  $\eta^2 = 1.00$ )
- Executive screening (IFS): ( $F(2, 144) = 20.47$ ,  $p = 0.00$ ,  $\eta^2 = 1.00$ )
- Logical Memory I: ( $F(2, 134) = 11.89$ ,  $p = 0.000$ ,  $\eta^2 = 0.99$ )
- Logical Memory II: ( $F(2, 134) = 11.89$ ,  $p = 0.000$ ,  $\eta^2 = 0.99$ )
- Visual Reproduction I: ( $F(2, 124) = 18.77$ ,  $p = 0.00$ ,  $\eta^2 = 1.00$ )
- Visual Reproduction II: ( $F(2, 104) = 8.01$ ,  $p = 0.001$ ,  $\eta^2 = 0.95$ )
- Visual Reproduction II - copy: ( $F(2, 122) = 35.19$ ,  $p = 0.000$ ,  $\eta^2 = 1.00$ )
- Attention (Mental Control): ( $F(2, 132) = 27.29$ ,  $p = 0.000$ ,  $\eta^2 = 1.00$ )
- Verbal Fluency-Semantic: ( $F(2, 142) = 16.28$ ,  $p = 0.000$ ,  $\eta^2 = 1.00$ ).
- Verbal Fluency-Phonological: ( $F(2, 142) = 52.64$ ,  $p = 0.000$ ,  $\eta^2 = 1.00$ )
- Quality of Life (WHOQOL-Bef): MCI ( $F(2, 126) = 3.27$ ,  $p = 0.04$ ,  $\eta^2 = 0.61$ ).
- Daily living functionality (ADL %): Time and Group significant effects

### Reference

Meireles, L. & Vicente, S. G. (2001). *ImproveCog*, a cognitive stimulation program for people with mild cognitive impairment and dementia: First stage of development. *PSICOLOGIA (35)2*: 27-44. <https://doi.org/10.17575/psicologia.v35i2.1734>

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