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Critically Appraised Paper for "Cognitive stimulation of executive functions in mild cognitive impairment: Specific efficacy and impact in memory"

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CRITICALLY APPRAISED PAPER

Moro, V., Condoleo, M. T., Valbusa, V., Broggio, E., Moretto, G., & Gambina, G. (2015). Cognitive stimulation of executive functions in mild cognitive impairment: Specific efficacy and impact in memory. *American Journal of Alzheimer's Disease and Other Dementias, 30,* 153–164. http://dx.doi.org/10.1177/1533317514539542

CLINICAL BOTTOM LINE:

Executive functions play a pivotal role in an individual's independence. However, little research has been conducted on the efficacy of specific cognitive training for individuals with deficits consistent with mild cognitive impairment (MCI). The researchers in this study aimed to use a cognitive stimulation program that taught specific strategies to enhance the participants' attentional and executive functional tasks. The study, using a crossover design involving two groups, included 30 participants affected by the amnestic form of MCI, executive function deficits, or both. The 6-month training sessions addressed challenges through the use of individualized cognitive strategies and proposed activities to exercise specific cognitive functions, such as shifting between two or more tasks to target cognitive flexibility. The first 2 months of the program consisted of intensive treatment, with two individual sessions per week, starting with an in-depth discussion about the difficulties each participant was experiencing. A program was then planned and discussed with the participant and caregiver, after which cognitive strategies were created and implemented. The last 4 months of the program comprised one session per week involving cognitive strategies created by the therapists and tested by the participants and caregivers in daily life activities. During the training sessions, the caregivers were actively involved and played an important role by assisting the participants in implementing strategies in the home environment.

The results showed an improvement in executive function in participants affected by MCI after they participated in the program. Moreover, the study also showed that cognitive performance can decline over time without stimulation and may only be partially recovered with the stimulation program. The data indicate that individuals affected by MCI may benefit from the cognitive stimulation program in the early stages, before a decline in cognition. Furthermore, once decline has begun, only partial recovery of the lost cognitive function may be restored through this program. This study generated several significant findings in that individuals

affected by MCI can show improvement in executive function with specific cognitive stimulation. However, in recommending this cognitive stimulation program as an intervention in the field of occupational therapy, therapists should be cautious of the limitations and generalizability of this study as well as the labor-intensity demands of the intervention. Furthermore, the caregivers' influence created a limitation on the clinical application of this study. The caregivers were very involved in this study; however, almost no information was given regarding their characteristics.

RESEARCH OBJECTIVE(S)

List study objectives.

To discover the effectiveness of a cognitive stimulation program focused on executive function in individuals affected by MCI.

DESIGN TYPE AND LEVEL OF EVIDENCE:

Level II: Experimental crossover design

SAMPLE SELECTION

How were subjects recruited and selected to participate? Please describe.

The participants were recruited through convenience sampling from the Centre for Alzheimer's and Cognitive Disorders at the University Hospital of Verona, in Italy. The participants were selected from another, wider study; however, the method of recruitment was not reported.

Inclusion Criteria

The participants for the study met the revised Mayo criteria for an MCI diagnosis: Cognitive impairment was described by the participant, family, or both; cognitive impairment was confirmed with the neuropsychological test battery; the participants showed no impairment in daily activities; and there was an absence of dementia, as defined by the *DSM–IV*. The researchers included participants with the amnestic form of MCI and those who exhibited deficits in executive function. Signs of executive function deficits were also determined according to the revised Mayo criteria. Additionally, all of the participants were selected from a larger, undescribed study.

Exclusion Criteria

Participants excluded from the study were those with dementia, a history or symptoms of psychosis or depression, a current neurological or systemic disease, an underlying

cerebrovascular disease, or a history of head injury with loss of consciousness. Participants were also excluded if they had a history of alcoholism or substance abuse. In addition, magnetic resonance imaging was used to exclude underlying cerebrovascular disease, and standardized blood tests were used to exclude participants with temporary dementia.

SAMPLE CHARACTERISTICS

N= (Number of participants taking part in the study)	30

#/ (%) Male	NR		#/ (%) Female	NR

Ethnicity	All participants were native Italian speakers. Ethnicity was not reported.

Disease/disability diagnosis	Participants were affected by MCI of the amnestic form, executive function deficits, or both.

INTERVENTION(S) AND CONTROL GROUPS

Group A: Individualized intervention group

Brief description of the intervention	Group A received an individualized intervention program that focused on daily activities in which the participants might have to solve specific problems. The training sessions consisted of identifying individual problems, practicing proposed cognitive strategies in simulated activities, and, finally, integrating the cognitive strategies into participants' activities. Cognitive strategies implemented by the therapists included verbal and visual association, categorization, planning of complex tasks, and monitoring of task execution, all of which were integrated into the daily tasks of the participants. Moreover, the therapists proposed activities to do during the training program and at home that exercised specific cognitive functions, such as cognitive flexibility, multitasking, verbal logical reasoning, working memory, topographical planning, inhibitory control, problem solving, maintenance of attention over time, and decision making. Some examples of the activities include shifting between two or more tasks for cognitive flexibility, identifying specific steps needed to carry out an activity for planning, simulating real-life situations with new problems the participant had not faced before, and making

	decisions in simulated situations of conflict for decision making. Throughout the intervention process, caregivers participated and assisted the participants in therapy and helped implement strategies at home that were discussed during the therapy sessions.
How many participants in the group?	Final number of participants: 14 Number of participants who dropped out: 1 (6.6%) One participant in each group did not complete the third assessment (T3) at the end of the year; therefore, the analysis concerning T3 reflects 14 group participants.
Where did the intervention take place?	At the Centre for Alzheimer's and Cognitive Disorder of the University Hospital of Verona. The participants were also advised to practice skills from the training program in their home with the help of caregivers between weekly sessions.
Who Delivered?	Not reported
How often?	Two individual treatment sessions were provided weekly for the first 2 months, and one individual session per week was provided in the following 4 months. In the second 6 months, no intervention was provided. The sessions were also attended by the participants' caregivers.
For how long?	6 months

Group B: Control group

Brief description of the intervention	After the initial assessments, Group B did not receive any intervention for 6 months. In the second 6 months of the study, Group B received the individualized intervention program as described above for Group A.
How many participants in the group?	Final number of participants: 14 Number of participants who dropped out: 1 (6.6%) One participant in each group did not complete the third assessment (T3) at the end of the year; therefore, the analysis concerning T3 reflects 14 group participants.

Where did the intervention take place?	At the Centre for Alzheimer's and Cognitive Disorder of the University Hospital of Verona. The participants were also advised to practice skills from the training program in their home with the help of caregivers between weekly sessions.
Who Delivered?	Not reported
How often?	In the first 6 months, no intervention was provided. In the second 6 months, two individual treatment sessions were provided weekly for the first 2 months, and one individual session per week was provided for the following 4 months. The sessions were also attended by the participants' caregivers.
For how long?	6 months

Intervention Biases: *Check yes, no, or NR and explain, if needed.*

Contamination:

YES ☐ NO ☑ NR ☐	*Comment:*

Co-intervention:

YES ☑ NO ☐ NR ☐	*Comment:* In this study, there was a chance of cointervention because the participants were selected from a larger pool of participants in a wider study addressing neuropsychological assessments in MCI.

Timing:

YES ☑ NO ☐ NR ☐	*Comment:* The study was completed in an adequate amount of time, given that it was conducted over 1 year. The initial 2 months of the intervention consisted of two training sessions every week, which allowed for the training to be focused on the participants' difficulties of daily life. The consecutive 4 months consisted of one session per week to allow participants time to practice the strategies at home with their caregivers.

Site:

YES ☑	*Comment:* The cognitive therapy sessions were completed at the Centre

NO ☐ NR ☐	for Alzheimer's and Cognitive Disorder of the University Hospital of Verona, but the participants practiced the strategies at home with their caregivers. This might have created bias because each participant's home environment was different and the level of assistance provided by the caregiver differed for each participant.

Use of different therapists to provide intervention:

YES ☐ NO ☐ NR ☑	*Comment:*

MEASURES AND OUTCOMES

The following measures used in this study were analyzed based on their relevance to occupational therapy:

Measure 1:

Name/type of measure used:	Montreal Overall Cognitive Assessment		
What outcome was measured?	General function in cognitive domain		
Is the measure reliable?	YES ☐	NO ☐	NR ☑
Is the measure valid?	YES ☐	NO ☐	NR ☑
When is the measure used?	The initial assessment was administered before any intervention. Subsequent assessments were administered at 6 months and 12 months.		

Measure 2:

Name/type of measure used:	Tower of London		
What outcome was measured?	Assesses for deficits in executive function, specifically the problem solving and planning skills of the participant		
Is the measure reliable?	YES ☐	NO ☐	NR ☑

Is the measure valid?	YES ☐	NO ☐	NR ☑
When is the measure used?	The initial assessment was administered before any intervention. Subsequent assessments were administered at 6 months and 12 months.		

Measure 3:

Name/type of measure used:	Rivermead Behavioral Memory Test		
What outcome was measured?	Assesses visual, verbal, recall, recognition, immediate, and delayed everyday memory (Wilson et. al., 2008)		
Is the measure reliable?	YES ☐	NO ☐	NR ☑
Is the measure valid?	YES ☐	NO ☐	NR ☑
When is the measure used?	The initial assessment was administered before any intervention. Subsequent assessments were administered at 6 months and 12 months.		

Measure 4:

Name/type of measure used:	Trail Making Test		
What outcome was measured?	Used to examine executive function		
Is the measure reliable?	YES ☐	NO ☐	NR ☑
Is the measure valid?	YES ☐	NO ☐	NR ☑
When is the measure used?	The initial assessment was administered before any intervention. Subsequent assessments were administered at 6 months and 12 months.		

Measure 5:

Name/type of measure used:	Dual Task Assessment

What outcome was measured?	Assesses divided attention, specifically postural control of an individual while he or she is completing a novel task		
Is the measure reliable?	YES ☐	NO ☐	NR ☑
Is the measure valid?	YES ☐	NO ☐	NR ☑
When is the measure used?	The initial assessment was administered before any intervention. Subsequent assessments were administered at 6 months and 12 months.		

Measure 6:

Name/type of measure used:	Test of Everyday Attention		
What outcome was measured?	Assesses attention in several everyday activities.		
Is the measure reliable?	YES ☐	NO ☐	NR ☑
Is the measure valid?	YES ☐	NO ☐	NR ☑
When is the measure used?	The initial assessment was administered before any intervention. Subsequent assessments were administered at 6 months and 12 months.		

Measurement Biases

Were the evaluators blind to treatment status? *Check yes, no, or NR, and if **no**, explain*.

YES ☐ NO ☐ NR ☑	*Comment:*

Recall or memory bias. *Check yes, no, or NR, and if **yes,** explain*.

YES ☑ NO ☐ NR ☐	*Comment:* The same set of assessments was given at three different times throughout the study, which creates the potential for recall bias or learned effect.

RESULTS

Was this study adequately powered (large enough to show a difference)? *Check yes, no, or NR, and if **no**, explain.*

YES ☐ NO ☑ NR ☐	*Comment:* This study was not adequately powered, because each group only had 15 participants. Bias can be created when a statistically significant change in scores relates to a small sample size.

Were appropriate analytic methods used? *Check yes, no, or NR, and if **no**, explain.*

YES ☑ NO ☐ NR ☐	*Comment:*

Were statistics appropriately reported (in written or table format)? *Check yes or no, and if **no**, explain.*

YES ☑ NO ☐	*Comment:*

Was the percent/number of subjects/participants who dropped out of the study reported?

YES ☑ NO ☐

Limitations:

What are the overall study limitations?

The overall limitations of this study include the inability to obtain quantitative data from neuroimaging to correlate behavioral changes with neural changes, as well as the small sample size, the inability to quantify the data concerning questionnaires and self-reports, and the high number of sessions required during the intervention period.

CONCLUSIONS

State the authors' conclusions related to the research objectives.

This research studied the efficacy of a cognitive stimulation program, specifically focused on executive function and memory, in participants affected by MCI. The training sessions were carried out individually and tailored to the needs of each participant. The program focused on targeting daily issues rather than specific cognitive functions. Results indicated a positive effect on memory and general cognitive function. They also showed that participants with MCI who have not received specific stimulation training may decline in performance over time and can

only partially recover skills with cognitive stimulation training. Another contributing factor of the program is the involvement of the caregivers. The caregivers played an important role in training the participants' abilities and using strategies in the context of daily life. However, because of the small sample size, the evidence presented might not be generalizable. The authors concluded that further research is needed to evaluate subjective measurements of the well-being for individuals affected by MCI and to address parallels between neuroimaging and neuropsychology.

Reference

Wilson, B. A., Greenfield, E., Clare, L., Baddeley, A., Cockburn, J., Watson, P., & Crawford, J. R. (2008). The Rivermead Behavioural Memory Test–Third Edition (RBMT–3) London: Pearson Assessment.

This work is based on the evidence-based literature review completed by Avery Wilson, OTS; Yamin Zaw, OTS; Malcolm Isely, OTS; and Kitsum Li, OTD, OTR/L, Faculty Advisor, Dominican University of California.