

# Intervention with strategic metacognitive training in a population of elders with subjective cognitive decline

## Intervento strategico metacognitivo in una popolazione di anziani con declino cognitivo soggettivo

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**Key words:** cognitive training, metacognition, strategic training, subjective cognitive decline, elders.

### ABSTRACT

**Objectives:** this research, conducted at the University Hospital of Alessandria, aimed to assess the impact of strategic metacognitive training on cognitive abilities, well-being, and the reduction of depressive symptoms in an elderly population.

**Materials and Methods:** the study included a sample of 11 subjects, aged 66 to 81 years, exhibiting subjective cognitive decline. They had to learn mnemonic strategies and, through the metacognitive task, reflecting on the learning and application processes. The training included 10 sessions, once a week. Cognitive functioning was assessed using the Repeatable Battery for Assessment of Neuropsychological Status (RBANS) in pre-test and post-test evaluations. *Ad hoc* tests were employed to investigate the effects of practice and generalization. Well-being, measured through the Psychological Well-being Questionnaire (BEN-SSC), and depressive status, assessed with the 15-item short form Geriatric Depression Scale (sfGDS), were also evaluated before and after the intervention.

**Results:** the cognitive measurements yielded no significant findings, except for a tendency toward significance in the visuo-spatial and language ability index of the RBANS, indicating a slight improvement. Regarding well-being and mood, also here no results emerged in favor of significance. The only significant data was a reduction in personal satisfaction according to the BEN-SSC.

**Conclusions:** the obtained results may be explained by potential inadequacies in the methodology, specifically in the structure and planning of the training. However, participants expressed interest in this type of intervention, demonstrating adherence in other training program.

**Obiettivi:** in questa ricerca, svolta presso l'azienda Ospedaliero-Universitaria di Alessandria, si è svolto un intervento di training strategico metacognitivo al fine di individuare eventuali benefici sulle abilità cognitive, ma anche sul benessere e sulla riduzione di sintomi depressivi in una popolazione di anziani.

**Materiali e Metodi:** il campione era composto da 11 persone, tra dai 66 agli 81 anni, con autovalutazione di declino cognitivo. Essi dovevano imparare strategie di memorizzazione e attraverso il compito metacognitivo riflettere sui processi di apprendimento e applicazione. Il training ha previsto 10 incontri, una volta a settimana. Sono stati misurati i funzionamenti cognitivi pre-test e post-test attraverso la batteria Repeatable Battery for Assessment of Neuropsychological Status (RBANS) e utilizzato prove ad hoc per indagare gli effetti pratica e generalizzazione. Sono stati misurati prima e dopo l'intervento anche il benessere, attraverso il questionario Psychological Well-being Questionnaire (BEN-SSC), e lo stato depressivo con short form Geriatric Depression Scale (sfGDS) a 15 items.

**Risultati:** dai risultati ottenuti sulle misurazioni cognitive non emergono valori significativi se non una tendenza alla significatività per l'indice abilità visuo-spaziale e linguaggio dell'RBANS, che mostrano un leggero miglioramento. Relativamente al benessere e all'umore anche qui non emergono risultati a favore della significatività. Unico dato significativo è la riduzione della soddisfazione personale al BEN-SSC.

**Conclusioni:** ciò che potrebbe giustificare i risultati ottenuti sono alcune inadeguatezze nella metodologia in cui l'alta richiesta cognitiva del training può essere entrata in conflitto con le caratteristiche del campione.

## Introduction

The Psychology Department at the “SS. Antonio e Biagio e Cesare Arrigo” hospital has actively collaborated with the Neurology and Geriatrics services for several years, aiming to promote early diagnostic interventions for neurodegenerative pathologies. Additionally, the Department has been involved in developing therapeutic guidelines and subsequent strategies for implementation. Notable examples of this collaboration include studies conducted on Mild Cognitive Impairment (MCI) and multiple sclerosis.<sup>1,2</sup> The COVID-19 health emergency disrupted many rehabilitation and preventive interventions in progress during that period. Despite these challenges, the following study represents a continuation of research focused on preventing the onset of neurodegenerative disorders, particularly through cognitive training interventions.

The first meta-analysis examining the efficacy of cognitive training in healthy elders was conducted by Verhaeghen, Marcoen, and Goossens.<sup>3</sup> This study encompassed interventions utilizing various strategies such as the method of loci, pegword, imagery (paired associates), name-face associations, and organization. Substantial benefits in episodic memory from pre- to post-test were observed in training groups compared to control groups or other activities, like discussion groups or attentional training (placebo). Nevertheless, certain limitations were identified, including the lack of differences in effectiveness between memory training and no evidence of a generalization effect.

The generalization effect refers to the ability to demonstrate the utility of an intervention in various settings, with a particular emphasis on its transferability to everyday activities, with a more ecological function. This effect can also assume two other aspects: an improvement in other abilities different from the one trained (“far transfer”), and an enhancement in different tasks but of the same ability (“near transfer”). Meta-analyses attempting to measure these effects have shown more significant results for tasks involving “near transfer” than those related to “far transfer”.<sup>4,5</sup> Metacognitive aspects, such as elders’ beliefs about themselves, play a role in influencing these processes, with negative self-perceptions hindering successful outcomes. Indeed, they consider themselves not able to carry out memory tasks, allocating the cause of their unsuccess to external and uncontrollable factors.<sup>6</sup>

Recent research has explored approaches to promote the generalization effect in mnemonic training. The “learner-oriented” method, where older individuals actively participate in the learning process, has shown positive results.<sup>7</sup> This approach involves acquiring mnemonic strategies to organize and retrieve new information, coupled with metacognitive reflection on applying these strategies in diverse situations. The aim of the learner-oriented approach is to facilitate the participant to extend the strategies they have learned to other tasks too, receiving information on how to adapt these strategies to new material.

The efficacy of these interventions has been validated both in groups handled by professionals and in self-managed groups, where elders can consult a manual for training guidance.<sup>7,8</sup> There is other evidence, albeit with different methodologies, that had hopeful results with the “learner-oriented approach”, promoting the engagement of the elders in adapting the learned strategies to the situation.<sup>9</sup>

A recent meta-analysis by Sella and colleagues underscores the positive outcomes of metacognitive and strategic metacognitive training on cognitive measures, metacognitive aspects, and well-

being.<sup>10</sup> The analysis primarily focuses on strategic metacognitive training, showing short-term benefits in memory performance, improvements in beliefs about cognitive functioning, and positive effects on self-efficacy related to memory. However, there are still uncertainties regarding the long-term maintenance of acquired abilities and the generalization effect.

Building on these findings, our study adopts the “learner-oriented” approach utilized by the University of Pavia (Department of Brain and Behavioral Sciences), making modifications to enhance the research methodology.<sup>7,8,11-13</sup> These modifications include incorporating a neuropsychological battery for pre and post-tests, introducing well-being and depression questionnaires, and expanding the strategic metacognitive training program with additional sessions, exercises, and mnemonic strategies (e.g., categorization, Preview, Question, Read, Summary, Test, PQRST).

In our research we expect that the strategic metacognitive training will demonstrate: i) memory gains, specifically in working memory, as measured by neuropsychological assessments; ii) a significant practice effect and generalization effect in their specific tasks; iii) enhancement of the global well-being state and reduction or maintained depression questionnaire scores.

## Materials and Methods

### Participants

#### Enrollment

In this research, we enrolled adults who were aged 65 years. Participants were recruited from the Neuropsychology service or the Center for Cognitive Disorders and Dementia (CDCD) at the “SS. Antonio e Biagio e Cesare Arrigo” University Hospital in Alessandria. Following the diagnostic process, they were categorized as people with subjective cognitive decline, characterized by a global psychometric assessment within the limits and slight discrepancies among the different abilities investigated. This intervention aligns with strategies emphasizing primary prevention. Subsequently, patients were contacted via telephone to ascertain their willingness to participate in the treatment, and individual appointments were scheduled for pre-intervention sessions. The earliest recorded access to the hospital service occurred in November 2021.

#### Inclusion criteria

The inclusion criteria were the ability to independently or with assistance access the service, the absence of a dementia diagnosis, an age between 65 and 85 years, literacy, and global cognitive assessments within the normal range

#### Sample

The total number of participants is 11 (6 males, 5 females), ranging in age from 66 to 81 years (Mean,  $M=74.82$ , Standard Deviation,  $SD=4.22$ ), as summarized in Tables 1 and 2. All participants are Italian, with the majority residing in Alessandria. The subjects have a minimum of 5 years of education to a maximum of 13 years ( $M=8.64$ ,  $SD=2.69$ ). They are all retired, except for one who is a housewife. None of them have received a diagnosis of dementia, though a few have been diagnosed with other conditions, including 1 case of Parkinson’s disease, 1 ischemic stroke, 1 neoplasm in the stomach and bladder, 1 case of osteoporosis and diabetes.

## Intervention

### Cognitive training

This intervention primarily focuses on utilizing materials that accurately represent situations encountered in the daily lives of older individuals. It is based on strategic training, emphasizing the learning and application of mnemonic strategies and mnemotechnics. The training program is designed to span a minimum of 9 to a maximum of 12 weekly sessions. Each session lasts approximately 1.5 to 2 hours and involves groups of 8-10 individuals to ensure adequate engagement and discussion for each participant. The training materials are derived from the book “La Memoria degli Anziani.”<sup>14</sup>

The first part of the training is psychoeducational, covering theoretical aspects of memory functioning, biological foundations, the relationship between memory and aging, and different methods to enhance memorization abilities. Each session addresses different aspects of memory related to specific situations encountered in everyday life, including recalling names and figures, places and routes, names and faces, remembering text, and prospective memory for future tasks.

The second part of the training is dedicated to exercises for each session, comprising 2-3 tests related to the specific topic. Each exercise includes both pre- and post-intervention versions to measure potential improvements. The materials consist of paper-and-pencil tasks, the exercises are easily reproducible, and require no more than 5-10 minutes to complete. Specific mnemonic strategies, termed “cognitive strategies,” are employed in this intervention, including categorization, phrase generation, imagery, and interactive images.

### Metacognitive task

In order to enhance the performance of elderly participants and stimulate them to learn the mnemonic strategies, we adopted the metacognitive task that consists of a deeper analysis of each exercise. The task is to answer different questions about the cognitive exercise; it lasts not more than 5-10 minutes. The first question aims to improve understanding of the test’s instructions, mitigating potential misunderstandings or comprehension errors (“What is the request of the test that I have to face?”). The second question focuses on identifying the type of information used in the task, such as verbal or visual, to encourage the adoption of the most appropriate mnemonic strategies (“What are the characteristics of the materials in use?”). To facilitate the recall phase, participants are prompted to identify any cues in the task that may stimulate memory, such as the presence of a mute street map in the task “learning and recalling of

a famous art city map” (“What are the most relevant elements in the task?”). The final question seeks to identify the optimal mnemonic strategy based on the exercise’s characteristics, aiming to save time during execution and better prepare participants (“Which mnemonic strategy can I use for this exercise?”).<sup>15</sup>

It is important to note that the metacognitive task was not employed during the pre- and post-evaluation phases.

### Cognitive measures

#### Words in pair

This test, along with the “grocery list”, was utilized in both the pre- and post-intervention phases and is derived from the training program “Come mantenere giovane il cervello” (How to keep the brain young).<sup>15</sup> The test involves presenting a sheet with a list of 30-word pairs separated by a segment, with the first word underlined and the second not. After a 5-10-minute period for learning the pairs, the sheet containing the word pairs is removed, and another sheet with only the underlined words is presented in random order. Participants are then required to recall the word associated with the underlined word.

#### Grocery list

This task entails learning a list of 30 products available in a supermarket within a maximum timeframe of 10 minutes. Subsequently, participants are asked to recall the words on a blank sheet of paper.

### Repeatable Battery for Assessment of Neuropsychological Status

The “Repeatable Battery for Assessment of Neuropsychological Status” (RBANS) is an individually administered neuropsychological battery test with a brief duration. Its primary objective is to assess the global cognitive function of adults by examining various abilities, including attention, language, visuo-spatial and visuo-constructive abilities, immediate and delayed memory. The test comprises two versions (A form and B form) of equal difficulty, each with 12 subtests and a total administration time of 30 minutes. Raw scores are assigned to each subtest, which are then converted into index scores corresponding to specific domains. Additionally, a total index score is calculated. The test exhibits good test-retest stability, particularly between the total index scores ( $r = 0.88$ ). Normative data for the Italian population are derived from a representative sample of 365 subjects residing in northern Italy.<sup>16</sup>

**Table 1.** Demographic characteristics.

	N	Minimum	Maximum	Mean	Standard deviation
Age	11	66	81	74.82	4.22
Education	11	5	13	8.64	2.69

**Table 2.** Demographic characteristics (gender).

	Frequency	Percentage	Valid percentage	Cumulative percentage
Male	6	54.5	54.5	54.5
Female	5	45.5	45.5	100.0
Total	11	100.0	100.0	

## Non-cognitive measures

### Geriatric Depression Scale - short form (15 items)

The Geriatric Depression Scale (GDS) is a self-report questionnaire used with the elderly population to detect depressive states. The original 30-item version has been subsequently revised to a shorter 15-item questionnaire, reducing administration time and effort. The scale is composed of 15 dichotomous questions requiring the participants to respond with “yes” or “no” based on their feelings over the past two weeks.<sup>17</sup> Five items reflect a positive attitude towards life (*i.e.*, Do you feel happy most of the time?) while the other ten items assess dissatisfaction towards life (*i.e.*, Do you feel that your life is empty?) or personal problems (*i.e.*, Do you feel that you have more problems with memory than most?).<sup>18</sup> The total score is calculated by summing all item scores, and if the score exceeds the cutoff point, further investigation into the patient’s emotional state is warranted. The cutoff point in different research is between 5 and 6.<sup>19</sup> This instrument presents some limits as a low internal validity.<sup>18,20</sup> Nevertheless, it is found to be one of the most widely used tools for screening depressive symptoms in the elderly population.<sup>21-23</sup>

### Questionario Ben-essere Psicologico (“Psychological Well-being Questionnaire”)

This instrument assesses the level of well-being in adults and in the elderly. It is composed of 37 items, each one requires to answer on a -points Likert scale (from “Never”=1 to “Always”=4). The questionnaire is ecologically designed, addressing everyday life moments, with no time constraints for administration. It can be completed independently by the adult or read aloud by the operator, who records the answers. Well-being is categorized into three subcategories: “personal satisfaction” (Ben-sp), “coping strategies” (Ben-sc), “emotional skills” (Ben-ce). The first is related to the past, present and future life satisfaction (*i.e.*, When I wake up in the morning, I am pleased with life and with myself). The second relates to the individual’s ability to cope with life’s challenges, perception of their capabilities, autonomy, and independence (*i.e.*, I feel that I am able to cope with difficult situations). The third explores the individual’s capacity to recognize and understand emotions, along with satisfaction in social relationships (*i.e.*, I understand if someone is angry with me).

A global well-being score (Ben-tot) is calculated by summing all item scores, and the questionnaire demonstrates good reliability (Ben-tot, Cronbach’s  $\alpha=0.91$ ).<sup>24</sup>

## Procedure

A total of 10 sessions were conducted once a week, spanning a three-month period from September to November 2022. Each session lasted 1.5 hours. Participants were divided into two groups, comprising 5 and 6 individuals, respectively, considering spatial constraints and aiming to provide an optimal learning experience. The division was based on participants’ availability and ensured an equal distribution of males and females in each group. Sessions were held in the morning at the “SS. Antonio e Biagio e Cesare Arrigo” University Hospital in Alessandria, utilizing a room within the Center for Cognitive Disorders and Dementia (CDCD). The sessions were led by a psychologist trained for this specific type of intervention.

The first and last sessions were conducted individually to administer the pre- and post-tests, including the neuropsychological battery and self-report questionnaires. The second and penulti-

mate sessions involved the administration of two tests measuring practical and generalization effects, derived from the training program “Come mantenere giovane il cervello” (“How to keep the brain young”).<sup>15</sup> The remaining eight sessions were dedicated to strategic metacognitive training. Specific paper notes were provided for each session topic.

The structure of each training session comprised the first half-hour devoted to the psychoeducational segment, explaining the theoretical aspects of the topic. The subsequent hour was dedicated to the practical part, involving exercises and the application of mnemonic strategies. Before each exercise, participants completed the metacognitive task “Analisi del compito” (Task analysis). Typically, one or two exercises were proposed, followed by a discussion period to address any difficulties encountered with the tasks and share the mnemonic strategies employed. We shared the results with both groups one month after concluding the training.

## Results

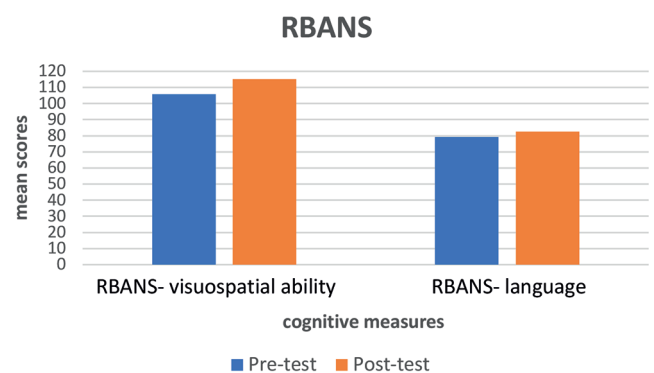
### Data analysis

The statistical software SPSS was employed for data analysis. Due to the small sample size, non-parametric analysis was chosen, specifically utilizing the Wilcoxon test. Additionally, a paired samples Wilcoxon test was applied to compare pre- and post-intervention results within the same group of experimental subjects. Outliers were included from the test-retest analysis, yielding higher non-significant results. To maintain the integrity of the sample data, all scores were retained.

### Cognitive tests

Analysis revealed no significant differences for the practical test “grocery list”,  $z=-0.12$ ,  $p=0.905$ , and the generalization test “words in pair”,  $z=-0.68$ ,  $p=0.497$ . The RBANS battery exhibited a tendency toward significance in the index of visuospatial ability  $z=-1.84$ ,  $p=0.066$ , and language ability,  $z=-1.90$ ,  $p=0.059$ , both indicating a tendency to improve (Figure 1).

However, significant differences did not emerge in other indices, such as immediate memory ( $z=-1.58$ ,  $p=0.114$ ), delayed memory ( $z=-0.87$ ,  $p=0.386$ ), attention ( $z=-1.29$ ,  $p=0.196$ ), and total score



**Figure 1.** Repeatable battery for assessment of neuropsychological status (RBANS) visuospatial and language mean scores, pre- and post-test.



( $z=-0.70$ ,  $p=0.483$ ). Although not statistically significant, a slight worsening was observed in immediate and delayed memory tasks. Means and Standard Deviations are detailed in Table 3.

### Non cognitive tests

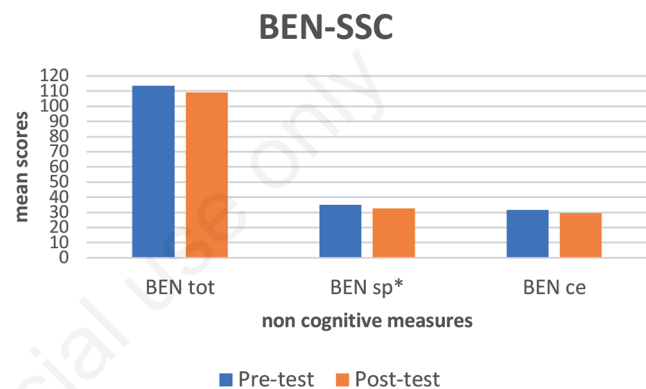
Comparing pre- and post-test results from the sfGDS and Ben-SSC, a deterioration in subjective evaluation was noted in both variables - mood and well-being. Despite non-significant results, the sfGDS yielded indices of  $z=0.42$ ,  $p=0.673$ , while the Ben-SSC exhibited a tendency toward significance, contrary to the third research hypothesis. Specifically, the total score,  $z=-1.91$ ,  $p=0.056$ , and the emotional competence index (ce),  $z=-1.89$ ,  $p=0.059$ , showed a tendency toward significance. The only statistically significant data was observed in the personal satisfaction index (sp),  $z=-2.28$ ,  $p=0.023$ , indicating a worsening in means from the pretest to posttest phase (Figure 2). The coping strategies index (sc),  $z=-1.28$ ,  $p=0.201$ , did not reach significance, but it was the only data point displaying a minor improvement post-intervention. Means and Standard Deviations are outlined in Table 4.

### Discussion

The data obtained from the training did not align with our initial expectations, leading to the disconfirmation of our three initial hypotheses. One plausible explanation for this discrepancy is that the intervention might not have been well-suited for the recruited subjects. A review by Sanjuán, Navarro, and Calero underscores that the duration of training is contingent upon the characteristics of the sample. They posit that a higher prevalence of pathologies and cognitive decline necessitates more time per session and a longer dura-

tion of training.<sup>25</sup> This suggests that additional sessions might have facilitated better assimilation of mnemonic strategies. Notably, our sample included participants with neurological diagnoses such as Parkinson's or stroke, despite normative neuropsychological screening test results. These conditions could have inadvertently impacted the training outcomes. The use of more different mnemonic strategies might have caused greater challenges than expected. Moreover, the limited number of subjects may have influenced the efficacy of statistical analysis.

Additionally, the low educational level of participants, with a mean of 8 years, could have affected the learning effects, in particular with negative results on the practical effect. In fact, the study by



**Figure 2.** Psychological well-being questionnaire (Ben-SSC), total, personal satisfaction, emotional competence mean scores, pre- and post-test. \* $p \leq 0.05$ .

**Table 3.** Results for cognitive measures: means, standard deviations, Wilcoxon test (z score and p-value).

	Pre-test	Post-test	z score	p-value
Grocery list	11.00 (3.55)	10.59 (6.86)	- 0.12	0.905
Words in pair	2.85 (3.53)	3.09 (3.38)	- 0.68	0.497
RBANS-tot	87.64 (19.32)	89.55 (16.91)	- 0.70	0.483
RBANS-immediate memory	87.27 (23.22)	81.82 (18.41)	- 1.58	0.114
RBANS-visuospatial ability	105.82 (16.39)	115.27 (19.75)	- 1.84	0.066
RBANS-language	79.18 (1.78)	82.73 (5.52)	- 1.90	0.059
RBANS-attention	84.18 (18.37)	88.45 (16.94)	- 1.29	0.196
RBANS-delayed memory	98.64 (19.49)	95.73 (18.93)	- 0.87	0.386

RBANS, repeatable battery for assessment of neuropsychological status.

**Table 4.** Results for non-cognitive measures: means, standard deviations, Wilcoxon test (z score and p-value).

	Pre-test	Post-test	z score	p-value
sfGDS	3 (2.19)	3.64 (3.14)	0.42	.673
BEN tot	113.55 (9.54)	109.09 (7.45)	- 1.91	.056
BEN sp	35.09 (4.55)	32.73 (4.56)	- 2.28	.023*
BEN sc	25.73 (3.61)	26.45 (1.51)	- 1.28	.201
BEN ce	31.64 (3.14)	29.64 (2.73)	- 1.89	.059

sfGDS, short form geriatric depression scale; BEN, psychological well-being questionnaire; \* $p \leq 0.05$ .

Rosi and colleagues emphasizes how initial mnemonic abilities and crystallized intelligence condition future benefits of memory training, with a higher performance level at the baseline predicting better results post-training.<sup>26</sup> If we compare our participants to those of Cavallini and colleagues, we can notice lower educational levels in our study.<sup>8-13</sup> The absence of positive feedback from the well-being and depression outcomes might be attributed to the highly demanding training for the cognitive capacity of participants and the presence of cognitively heterogeneous groups, with higher-performance elders who may have generated frustration in the more fragile one.

## Conclusions

To enhance the effectiveness of cognitive training, several aspects need reevaluation: the characteristics of the sample, appropriate training sessions, and dedicating more time to the acquisition of mnemonic strategies. Furthermore, it could be beneficial to introduce a follow-up after a few months, as demonstrated in some studies, probably allowing the participants to assimilate the learning.<sup>27,28</sup> Given our interest in studying mood and well-being factors, future interventions may benefit from a multifactorial approach, integrating relaxation techniques, body scans, or aspects of dysfunctional thinking with cognitive training. A notable strength of this research is the high adherence to the treatment, with no dropouts from the training. Notably, all participants expressed interest in being re-contacted for future cognitive training. Additionally, the same subjects engaged in autogenic training to address emotional and stressful life moments, although data on the effectiveness of this intervention are not available.

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## References

1. Pepoli A, et al. Mild Cognitive Impairment (MCI): l'incerto confine tra normalità e patologia. Working Paper of Public Health 2015;8:1-14
2. Pepoli A, De Luca F, Passantino F, Ruiz L. Progetto di presa in carico multidisciplinare dei pazienti con Sclerosi Multipla: presentazione di un modello di integrazione in ambito ospedaliero. 2019. Available from: <https://www.fisppsicologia.it/images/riviste/Link-2-2019/link-2019-pazienti-con-sclerosi-multipla.pdf>
3. Verhaeghen, P, Marcoen A, Goossens L. Improving memory performance in the aged through mnemonic training: a meta-analytic study. *Psychology and Aging* 1992;7:242-51.
4. Basak C, Qin S, O'Connell MA. Differential effects of cognitive training modules in healthy aging and mild cognitive impairment: a comprehensive meta-analysis of randomized controlled trials. *Psychology and Aging* 2020;35:220-49.
5. Mewborn, CM, Lindbergh CA, Stephen Miller L. Cognitive interventions for cognitively healthy, mildly impaired, and mixed samples of older adults: a systematic review and meta-analysis of randomized-controlled trials. *Neuropsychological Review* 2017;27:403-39.
6. De Beni R, Mazzoni G, Pagotto S. Fiducia nel proprio sistema di memoria e stili attributivi nell'anziano. Confronti tra differenti età e diversi contesti abitativi. *Ricerche di Psicologia* 1996;1996.
7. Bottiroli, S, Cavallini E, Dunlosky J, et al. The importance of training strategy adaptation: a learner-oriented approach for improving older adults' memory and transfer. *Journal of Experimental Psychology: Applied* 2013;19:205.
8. Cavallini E, Bottiroli S, Capotosto E, et al. Self-help memory training for healthy older adults in a residential care center: specific and transfer effects on performance and beliefs. *International Journal of Geriatric Psychiatry* 2015;30:870-80.
9. Hastings EC, West RL. The relative success of a self-help and a group-based memory training program for older adults. *Psychology and Aging* 2009;24:586-94.
10. Sella E, Carbone E, Vincenzi M, et al. Efficacy of memory training interventions targeting metacognition for older adults: a systematic review and meta-analysis. *Aging & Mental Health* 2023;27:674-94.
11. Cavallini E, Pagnin A, Vecchi T. Aging and everyday memory: the beneficial effect of memory training. *Archives of Gerontology and Geriatrics* 2003;37:241-57.
12. Cavallini E, Dunlosky J, Bottiroli S, et al. Promoting transfer in memory training for older adults. *Aging Clinical and Experimental Research* 2010;22:314-23.
13. Cavallini E, Bottiroli S, Dunlosky J, et al. Strategy-adaptation memory training: predictors of older adults' training gains. *Open Psychology* 2019;1:255-72.
14. Dentici OA, Amoretti G, Cavallini E. La memoria degli anziani. Una guida per mantenerla in efficienza. Edizioni Erickson; Rome, Italy; 2004. 195 pp.
15. Bottiroli S, Cavallini E. Come mantenere giovane il cervello. Newton Compton Editori; Rome, Italy; 2016.
16. Randolph C. RBANS update: Repeatable Battery for the Assessment of Neuropsychological Status: Manual. Pearson; Bloomington, MN, USA; 2009.

17. Yesavage JA, Sheikh JI. Geriatric Depression Scale (GDS) recent evidence and development of a shorter version. *Clinical Gerontology* 1986;5:165-73.
18. Incalzi RA, Cesari M, Pedone C, Carbonin PU. Construct validity of the 15-item Geriatric Depression Scale in older medical inpatients. *Journal of Geriatric Psychiatry and Neurology* 2003;16:23-8.
19. Pocklington C, Gilbody S, Manea L, McMillan D. The diagnostic accuracy of brief versions of the Geriatric Depression Scale: a systematic review and meta-analysis. *International Journal of Geriatric Psychiatry* 2016;31:837-57.
20. Chiesi F, Primi C, Pigliautile M, et al. The local reliability of the 15-item version of the Geriatric Depression Scale: An Item Response Theory (IRT) study. *Journal of Psychosomatic Research* 2017;96:84-8.
21. Azulai A, Walsh CA. Screening for geriatric depression in residential care facilities: a systematic narrative review. *Journal of Gerontological Social Work* 2015;58:20-45.
22. Mitchell AJ, Bird V, Rizzo M, Meader N. Diagnostic validity and added value of the Geriatric Depression Scale for depression in primary care: a meta-analysis of GDS30 and GDS15. *Journal of Affective Disorders* 2010;125:10-7.
23. Wancata J, Alexandrowicz R, Marquart B, et al. The criterion validity of the Geriatric Depression Scale: a systematic review. *Acta Psychiatrica Scandinavica* 2006;114:398-410.
24. De Beni R, Borrella E. BAC Benessere e Abilità Cognitive nell'età adulta e avanzata. Giunti Editore; Florence, Italy; 2007.
25. Sanjuán M, Navarro E, Calero MD. Effectiveness of cognitive interventions in older adults: a review. *European Journal of Investigation in Health, Psychology and Education* 2020;10: 876-98.
26. Rosi A, Del Signore F, Canelli E, et al. The effect of strategic memory training in older adults: who benefits most? *International Psychogeriatrics* 2018;30:1235-42.
27. Cheng Y, Wu W, Feng W, Wang J, et al. The effects of multi-domain versus single-domain cognitive training in non-demented older people: a randomized controlled trial. *BMC Medicine* 2012;10:30.
28. Gehling J. The effects of a cognitive training program for healthy older adults: a program evaluation study. Minnesota State University, Mankato, USA; 2020.

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