

Cognitive Interventions

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With older adults, cognitive intervention programs are most often used for preventing or reversing a decline in cognitive functions. Under the heading of cognitive intervention, a multitude of diverse programs are found. In order to classify this field, we will distinguish between: (1) cognitive training programs (programs that train basic cognitive strategies), (2) cognitive rehabilitation (mono or multidimensional programs on specific skills like memory, attention, arithmetic, etc.), and (3) cognitive stimulation (continuous practice programs or use of external resources).

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1. Introduction

For cognitive decline leading to dementia, today, pharmacological therapy alone is considered to have certain clinical limitations, and its long-term therapeutic effectiveness in the cognitive realm is being questioned ^[1]. Non-pharmacological interventions (NPI) are shown as a viable alternative for older adults to maintain or improve their cognitive status, whether they are healthy, or present cognitive impairment ^[2]. Within NPI, the multidisciplinary approach is one of the fundamental principles in the interventions for older adults ^[3]. In this field, many scientific disciplines have developed interventions aimed to reduce dementia risk and to alleviate symptoms associated with age-related pathological processes such as cognition-oriented treatments ^[4], multimodal therapies ^[5] and Transcranial Magnetic Stimulation ^[6], amongst others.

Among these NPI for the treatment of cognitive decline or dementia, cognitive intervention programs are currently most used for prevention or improvement in impaired cognitive functions ^[7]. In fact, cognitive intervention is the NPI that has received the most empirical support whether in dementia, in normal aging or in mild cognitive impairment, leading it to be put forward as the first choice for intervention in persons with dementia ^[8]. Under the heading of cognitive intervention, a multitude of diverse programs are found. In order to classify this field, we will distinguish between: (1) cognitive training programs (programs that train basic cognitive strategies), (2) cognitive rehabilitation (mono or multidimensional programs on specific skills like memory, attention, arithmetic, etc.), and (3) cognitive stimulation (continuous practice programs or use of external resources).

Asserting the benefits of cognitive interventions, we find several systematic reviews. For instance, Papp et al. ^[9] analyzed the effects of cognitive interventions in healthy older people and concluded that the training improved immediate performance in the tasks trained, but there was no evidence of generalization to general cognitive functioning. Similarly, the review by Martin et al., ^[10] including a total of 36 randomized controlled trials (RCTs) between 1985 and 2007, showed that immediate memory and verbal memory improved significantly in healthy older adults after a cognitive intervention program, and also in persons with mild cognitive impairment (MCI), but the results were not generalized to their general cognitive status. Căndea et al. ^[11] carried out a review of 32 RCTs of the effect of cognitive intervention on working memory, both in healthy older adults and in older adults with cognitive impairment, finding improvements in the cognitive performance of subjects who had been trained in working memory, without specifying whether this improvement was generalized to overall cognitive functioning. Besides, recent reviews ^{[4][12][13]} report scientific evidence for cognitive interventions since engaging in cognitively stimulating activities can be protective for age-related cognitive decline and dementia possibly by increasing cognitive reserve and resilience in later life ^{[4][12][13]}.

In the reviews cited above, cognitive intervention is found to have beneficial effects on the cognitive skills trained, but the results do not report whether these positive effects are maintained in the long term.

However, there are currently doubts about the effectiveness of cognitive interventions due to the vast heterogeneity of the studies. In 2017, the document entitled "Integrated care for older people: guidelines on community-level interventions to manage declines in intrinsic capacity," the World Health Organization (WHO) ^[14] indicated that there were insufficient high-quality research studies that report the effects of cognitive intervention in the cognitive functioning of older adults, that there are imprecise estimates of the benefits and risks, and/or that the benefits are very confined and limited in relation to cost.

2. The Effectiveness of Cognitive Interventions Designed for Older Adults

Regarding the type of measures, we observed that, regardless of cognitive status, assessment addressed memory, attention, executive function, general cognitive ability, functional ability and mood, to a greater or lesser degree. Studies with healthy older adults were the ones that most used measures of memory (74.6%), attention (60.6%) and processing speed (14.9%). Studies of older adults with MCI were the ones that most used measures of executive function (59%) and mood (43.6%) and studies of older adults with dementia made the most use of measures of general cognitive functioning (93.5%), functional ability (39.1%) and quality of life (28.3%). In this regard, we observed that with greater cognitive impairment, other noncognitive factors take on greater importance in the older adult's ability to carry on with daily living and have quality of life.

Most of the studies showed that a cognitive intervention produced improvement in general cognitive functioning, whether in healthy older adults (63.1% of the studies), with effect sizes from 0.13 to 0.42; in older adults with MCI (67.5% of the studies), with effect sizes from 0.37 to 0.41; or in older adults with dementia (68.1% of the studies), with effect sizes of 0.21.

Aside from general cognitive functioning, we also found benefits in healthy older adults in specific variables such as memory (with an effect size of 0.35); attention (with an effect size of 0.35); executive function (with an effect size of 0.42); visuo-spatial ability (with an effect size of 0.18) and psychological well-being (with an effect size of 0.25), in 68.9%, 64.8%, 55.9%, 19.4% and 25% of the studies, respectively. In the case of older adults with MCI, we found gains in memory (with an effect size between 0.30 and 0.45); attention (with an effect size of 0.35); executive function (with an effect size of 0.27); visuo-spatial ability (with an effect size of 0.43); mood (no effect size data); metacognition (with an effect size of 0.30); functional ability (with an effect size between 0.23 and 0.27) and quality of life (with an effect size of 0.10), in 51.7%, 30%, 35%, 20%, 31.8%, 50%, 42.5% and 20% of the studies, respectively. Finally, in older adults with dementia, we found improvement in quality of life, depressive symptoms and behavioral problems (in 44.4%, 50% and 33.3% of the studies, respectively, with effect size data not reported).

Furthermore, the efficacy and effects of the cognitive intervention on older adults' cognitive functioning were also shown to increase when other components such as decreasing stress and anxiety, participation in challenging, novel cognitive tasks, social participation, physical activity and healthy sleep habits were included, as can be observed in 7 of the 20 studies (35%) in the review by Bhome et al. ^[15]. In addition, personal/internal strategies (like using mnemonic rules) and environmental/external strategies (like using calendars, agendas, etc.) improved or maintained cognitive performance ^[16] according to 3 of the studies ^{[17][18][19]} found in the review by Simon et al. ^[20].

As for long-term maintenance of benefits offered by cognitive interventions, this was studied in 37%, 35.4% and 42.9% of the studies with healthy older adults, adults with MCI and adults with dementia, respectively. In all these studies, we find that the effects of training can be retained for at least two months, whether in memory or in executive domains, for healthy older adults and for adults with MCI ^{[21][22]}. According to contributions from Kelly et al. ^[23], it is possible to maintain these effects over a longer term if maintenance strategies are added ^{[24][25]}, with reinforcement sessions or an adaptive training paradigm ^{[26][27][28]}, with at least ten intervention sessions ^{[26][29]}.

3. Conclusion

Cognitive interventions have proven effective for maintaining and/or improving cognitive functioning in older adults regardless of their initial cognitive status. Even so, there are few studies that follow up these results to see whether they are maintained in the long term and whether there is transfer to other skills of daily life. However, we were able to observe how the participants' cognitive level varied according to sociodemographic differences, and to identify which components of cognitive programs make them more effective. Based on the results found, we highlight the importance of designing cognitive intervention programs that meet these effectiveness criteria, in order to maximize the positive effects of such programs when working with a population of older adults.

References

1. Spector, A.; Orrell, M.; Woods, B. Cognitive Stimulation Therapy (CST): Effects on different areas of cognitive function for people with dementia. *Int. J. Geriatr. Psychiatr.* 2010, 25, 1253–1258.
2. Davis, J.C.; Bryan, S.; Marra, C.A.; Hsiung, G.Y.R.; Liu-Ambrose, T. Challenges with cost-utility analyses of behavioral interventions among older adults at risk for dementia. *Br. J. Sports Med.* 2015, 49, 1343–1347.

3. Cordero, P.R.; Yubero, R. Tratamiento no farmacológico del deterioro cognitivo. *Rev. Esp. Geriatr. Gerontol.* 2016, 51, 12–21.
4. Sanz, S.; Castellani, M.; Belleville, B.; Dwoletzky, T.; HApstead, B.; Bahar-Fuchs, A. The design, evaluation, and reporting on non-pharmacological cognitive-oriented treatments for older adults: Results of a survey of experts. *Alzheimer Dement* 2020, 6, e12024.
5. Yorozya, K.; Kubo, Y.; Tomiyama, N.; Yamane, S.; Hanaoka, H. A systematic review of multimodal non-pharmacological interventions for cognitive function in older people with dementia in nursing homes. *Dement. Geriatr. Cogn. Disord.* 2019, 48, 1–16.
6. Transcranial Magnetic Stimulation to Address Mild Cognitive Impairment in the Elderly: A Randomized Controlled Study. *Behav. Neurol.* 2015, 2015, 287843.
7. Calero, M.D.; Navarro, E. Effectiveness of a memory training programme in the maintenance of status in elderly people with and without cognitive decline. *Psychol. Spain.* 2007, 11, 106–112.
8. National Institute for Clinical Excellence (NICE). Donepezil, galantamine, rivastigmine and memantine for the treatment of Alzheimer's disease. In NICE Technol. Appr. Guid. 217; National Institute for Clinical Excellence: London, UK, 2011; (Review of NICE Technology Appraisal Guidance 111).
9. Papp, K.V.; Walsh, S.J.; Snyder, P.J. Immediate and delayed effects of cognitive interventions in healthy elderly: A review of current literature and future directions. *Alzheimers. Dement.* 2009, 5, 50–60.
10. Martin, M.; Clare, L.; Altgassen, A.M.; Cameron, M.H.; Zehnder, F. Cognition-based interventions for healthy older people and people with mild cognitive impairment. *Cochrane Database Syst. Rev.* 2011, 1, 1–39.
11. Căndea, D.M.; Cotet, C.D.; Stefan, S.; Valenas, S.P.; Szentagotai-Tatar, A. Computerized cognitive training for working memory in older adults: A review. *Transylv. J. Psychol.* 2015, 16, 141.
12. Bahar-Fuchs, A.; Martyr, A.; Goh, A.M.; Sabates, J.; Clare, L. Cognitive training for people with mild to moderate dementia. *Cochrane Database Syst. Rev.* 2019, 3, CD013069.
13. Gavelin, H.M.; Lampit, A.; Hallock, H.; Sabatés, J.; Bahar-Fuchs, A. Cognition-oriented treatments for older adults: A systematic overview of systematic reviews. *Neuropsychol. Rev.* 2020, 30, 167–193.
14. WHO. Integrated Care for Older People: Guidelines on Community-Level Interventions to Manage Declines in Intrinsic Capacity; World Health Organization: Geneva, Switzerland, 2017; Available online: <https://apps.who.int/iris/handle/10665/258981> (accessed on 1 September 2020).
15. Bhome, R.; Berry, A.J.; Huntley, J.D.; Howard, R.J. Interventions for subjective cognitive decline: Systematic review and meta-analysis. *BMJ Open* 2018, 8, e021610.
16. Bouazzaoui, B.; Isingrini, M.; Fay, S.; Angel, L.; Vanneste, S.; Clarys, D.; Taconnat, L. Aging and self-reported internal and external memory strategy uses: The role of executive functioning. *Acta Psychol.* 2010, 135, 59–66.
17. Greenaway, M.C.; Hanna, S.M.; Lepore, S.W.; Smith, G.E. A behavioral rehabilitation intervention for amnesic mild cognitive impairment. *Am. J. Alzheimers Dis. Other Dement.* 2008, 23, 451–461.
18. Londos, E.; Boschian, K.; Lindén, A.; Persson, C.; Minthon, L.; Lexell, J. Effects of a goal-oriented rehabilitation program in mild cognitive impairment: A pilot study. *Am. J. Alzheimers Dis. Other Dement.* 2008, 23, 177–183.
19. Kinsella, G.J.; Mullaly, E.; Rand, E.; Ong, B.; Burton, C.; Price, S.; Phillips, M.; Storey, E. Early intervention for mild cognitive impairment: A randomised controlled trial. *J. Neurol. Neurosurg. Psychiatry* 2009, 80, 730–736.
20. Simon, S.S.; Yokomizo, J.E.; Bottino, C.M. Cognitive intervention in amnesic Mild Cognitive Impairment: A systematic review. *Neurosci. Biobehav. Rev.* 2012, 36, 1163–1178.
21. Reijnders, J.; van Heugten, C.; van Boxtel, M. Cognitive interventions in healthy older adults and people with mild cognitive impairment: A systematic review. *Ageing Res. Rev.* 2013, 12, 263–275.
22. Verhaeghen, P. The Interplay of Growth and Decline: Theoretical and Empirical Aspects of Plasticity of Intellectual and Memory Performance in Normal Old Age; Bäckman, R.D., Stigsdotter, L., Neely, A., Eds.; Oxford University Press: New York, NY, USA, 2000; pp. 3–22.
23. Kelly, M.E.; Loughrey, D.; Lawlor, B.A.; Robertson, I.H.; Walsh, C.; Brennan, S. The impact of cognitive training and mental stimulation on cognitive and everyday functioning of healthy older adults: A systematic review and meta-analysis. *Ageing Res. Rev.* 2014, 15, 28–43.
24. Klingberg, T. Training and plasticity of working memory. *Trends Cogn. Sci.* 2010, 14, 317–324.
25. Rebok, G.W.; Carlson, M.C.; Langbaum, J.B. Training and maintaining memory abilities in healthy older adults: Traditional and novel approaches. *J. Gerontol. Ser. B Psychol. Sci. Soc. Sci.* 2007, 62, 53–61.

26. Cheng, Y.; Wu, W.; Feng, W.; Wang, J.; Chen, Y.; Shen, Y.; Li, C. The effects of multi-domain versus single-domain cognitive training in non-demented older people: A randomized controlled trial. *BMC Med.* 2012, 10, 30.
27. Borella, E.; Carretti, B.; Riboldi, F.; De Beni, R. Working memory training in older adults: Evidence of transfer and maintenance effects. *Psychol. Aging* 2010, 25, 767.
28. Willis, S.L.; Tennstedt, S.L.; Marsiske, M.; Ball, K.; Elias, J.; Koepke, K.M.; Wright, E. Long-term effects of cognitive training on everyday functional outcomes in older adults. *JAMA Intern. Med.* 2006, 296, 2805–2814.
29. McDougall, G.J.; Becker, H.; Pituch, K.; Acee, T.W.; Vaughan, P.W.; Delville, C.L. The SeniorWISE study: Improving everyday memory in older adults. *Arch. Psychiatr. Nurs.* 2010, 24, 291–306.

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