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EFFECTIVENESS OF A MEMORY TRAINING PROGRAMME IN THE MAINTENANCE OF STATUS IN ELDERLY PEOPLE WITH AND WITHOUT COGNITIVE DECLINE

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The aim of this study was to analyze the effect of memory training on cognitive maintenance in older adults with and without cognitive decline. Method: 98 older adults participated in the study (59 in the treatment group and 39 in the control group). Participants were assessed at three points in time using diverse cognitive functioning tests, before training, immediately after training, and nine months after training. Those in the treatment group participated in a memory-training programme with 14 sessions. Results: Older adults in the treatment group improve their cognitive performance in the post-training tests, while members of the control group present a decline. Thus while there are no initial significant between-group differences, these become apparent after the training phase. Conclusions: The results show the positive effects of this type of training when working with the older adult population.
Key words: *cognitive training, memory training, cognitive decline, old age*

El objetivo del este estudio ha sido analizar el efecto de un entrenamiento en memoria en el mantenimiento cognitivo de ancianos con y sin deterioro cognitivo. Método: En la investigación han participado 98 ancianos (59 grupo tratamiento y 39 grupo control) que han sido evaluados en tres momentos temporales (antes del entrenamiento, después del mismo y tras 9 meses) con diversas pruebas de funcionamiento cognitivo. Las personas del grupo tratamiento han participado en un programa de entrenamiento en memoria de 14 sesiones. Resultados: Los resultados muestran que los ancianos del grupo tratamiento mejoran su rendimiento cognitivo en las evaluaciones posteriores al entrenamiento mientras que las del grupo control sufren un declive de tal manera que, aunque no existen diferencias significativas de partida entre grupos, éstas sí que se producen una vez introducida la fase de entrenamiento. Conclusiones: los resultados muestran los efectos positivos de este tipo de intervenciones cuando se trabaja con población anciana.
Palabras clave: *entrenamiento cognitivo; entrenamiento en memoria; deterioro cognitivo; vejez*

INTRODUCTION

Traditionally, ageing has been associated with the existence of a cognitive decline that depends on both physiological and environmental factors and which is subject to great inter-individual variability. With regard to environmental factors, it should be pointed out that they fulfil an important function in relation to loss of cognitive abilities, given the fact that, at least in part, up to a certain age cognitive functioning is determined and stimulated by a person's way and rhythm of life. Thus, on reaching old age, with the consequent reduction in environmental demands, cognitive abilities ebb away through lack of use (Jodar, 1994); such decline is at least partly responsible for the cognitive deterioration observed at this stage of life and which, according to research in the field – to be reviewed below – could be compensated by the type of cognitive training programmes (such as memory-improvement programmes) that are having positive results both in the healthy elderly and in those with cognitive decline or dementia.

The effectiveness of memory training in healthy elderly has been extensively demonstrated in various meta-analyses. These have shown how participation in this type of programme significantly improves both objective memory (Verhaeghen, Marcoen & Goossens, 1992) and subjective memory – or a person's perception of his or her own memory ability (Floyd & Scogin, 1997). Likewise, it has been shown that improvements resulting from participation in memory-training programmes are maintained over time for periods ranging from six months (Stigsdotter-Nelly & Bäckman,

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1995) to as much as three years (Scogin & Bienias, 1988) (for a review of the subject, see Verhaeghen, 2000). Thus, we could cite the work of Stigsdotter-Neely and Bäckman (1995), who analyzed the short and long-term effects of memory training in a group of 46 healthy elderly, finding a general increase in the treatment group in memory-test performance between successive assessments – an improvement that was maintained at six months –, while control group performance remained stable, with no successive improvements.

Similarly, Auffray and Juhel (2001), in a total of 82 people with a mean age of 80 years, reported a significant improvement in the treatment group in the assessment made after the memory training. This improvement was found not only in memory tests, but also in tests of attention and reasoning, and was maintained in the follow-ups at six and nine months.

In Spanish populations, one of the most important studies dealing with the long-term effects (six months) of memory training is that carried out by Montejo et al. (1999), who analyzed the efficacy of an 11-session memory-training programme followed by 1612 participants with a mean age of 69 years. The results indicated a significant improvement immediately after the treatment, and which had increased by the six-month follow-up. In general terms, the authors found that at the end of the training 17.9% of the sample maintained their performance, 15.4% had a lower score, and 66.7% showed a significant improvement in their performance.

Likewise, the effectiveness of memory training and the maintenance of effects over time have been tested in elderly people with cognitive decline in a range of studies. This is of particular relevance if we consider that cognitive decline can lead to the development of dementia in the medium term, as emerges from research by various authors, including Petersen and cols. (1999), who found that the annual rate of decline into dementia in persons with mild cognitive impairment is 12% (as against 1% of controls). Among studies demonstrating the effectiveness of memory-training programmes in elderly people with cognitive decline we can cite, for example, Yesavage (1989), who analyzed the effects of a memory-training programme in a sample of 128 people with a mean age of 69 and age-related memory deterioration. This author succeeded in significantly improving participants' performance in memory tasks based on the learning and subsequent recall of names.

Other authors that have tested the efficacy of memory training in persons with mild cognitive impairment include Panza et al. (1996), who worked with a total of 16 persons aged 60 to 75 and diagnosed with this problem. These participants were assigned to a control group or a memory rehabilitation programme. The assessment carried out indicated a significant improvement for the treatment group in the memory assessment tests.

In another study, De Vreese et al. (1998) reported research in which they analyzed the effectiveness of memory training on improvement in a group of elderly persons with mild cognitive decline and/or subjective memory complaints, with the aim of exploring whether the benefits obtained from training by those with only subjective memory complaints are equal to those obtained by those who, in addition to such complaints, present mild cognitive decline. It emerges from the results obtained that, while all experience significant improvement in their memory after participating in the training, those who most benefit from it are those with mild cognitive decline. According to the study's authors, this may be due to the fact that the memory training, on generating cognitive stimulation, triggers an unused reserve cognitive capacity that would remain present in people with mild cognitive impairment. From this perspective, the therapeutic efficacy of a cognitive training programme would be directly proportional to its degree of necessity, so that the greater the decline, the more effective the memory training (De Vreese, Belloi, Iacono, Finelli, & Neri, 1998).

As we have tried to show, memory training appears to have beneficial effects both in the healthy elderly and in those with cognitive decline. However, the studies carried out up to now have not tended to include control groups, thus precluding comparison between the effects of the training and the effects on memory of the simple passage of time and/or the everyday occupation of the elderly people. Nor do these studies clarify whether the improvement obtained in the training programmes transfer to the general cognitive performance in the elderly participants.

Therefore, the objective of the study reported here was to analyze the immediate and medium-term effect of memory training, in healthy elderly and those with cognitive decline, in tests of general cognitive performance.

METHOD

Participants

A total of 98 elderly people (59 in the treatment group and 39 in the control group) selected from Old People's Homes (71.4%) and from the Psychological Care

Service at the University of Granada (28.6%). Age range was 60 to 98 years (mean 76.85 and standard deviation 8.37). Women made up 65.4% of the sample, men 34.6%. As far as educational level is concerned, 35.6% were functional illiterates – with only basic reading and writing skills –, while 64.4% had received some type of academic education (38.6% primary, 20.5% secondary, and 5.3% further or higher). It should also be pointed out that 19 control group participants and 22 from the treatment group presented cognitive decline according to the criteria set for Spanish population (Lobo & Día, 1986; Calero, Navarro, Robles & García-Berbén, 2000).

Assessment instruments

Mini-Examen-Cognoscitivo (MEC, Lobo, Ezquerra, Gómez, Sala & Seva, 1979): Spanish translation and adaptation of the Mini-Mental-State-Examination (MMSE, Folstein, Folstein, & McHugh, 1975). The MEC is a screening instrument widely used in the detection of cognitive decline that explores rapidly and in a standardized way a set of cognitive functions (temporal-spatial orientation, immediate and long-term memory, attention, calculation, language, abstract reasoning and praxias) that can be affected in older people. The final score obtained on this test is generally used as a global index and as a means of evolutional follow-up of the cognitive functions in processes such as cognitive decline and dementia. In previous studies this test has shown its concurrent validity with a broad battery of neuropsychological assessment instruments (Calero et al., 2000). In order to divide the sample into those with and without cognitive decline we took into account the results from authors such as Lobo and Día (1986) with geriatric population, Vilalta et al. (1990) in their validation of the CAMDEX, and Manubens et al. (1998), as well as those obtained by our research group in a previous analysis in which we set the cut-off point more sensitively and in closer diagnostic agreement for our sample group. From these studies it emerges that the optimum cut-off point in this test for identifying the presence of cognitive decline in low-educated over-65s is 24 points (from a maximum of 35), and that when the education level is medium-to-high it is 27 points.

Working memory assessment test (Oakhill, Yuill, & Parkin, 1989): this test measures the extent of working memory through the presentation of cards each bearing three numbers. Respondents must read the three numbers aloud and remember the last one, since they will subsequently be required to recall them, after all the cards have been shown. The number of cards increases according to the person's performance, so that the test begins with two cards and finishes up with five – as long as the respondent successfully completes the previous phases.

Memory training programme

Programa de mejora de la memoria en personas mayores à Memoria 65+ (Memory Improvement Programme for over-65s, Dively & Cadavid, 1999). This is a programme aimed at teaching participants the different strategies and memory aids available so that they can apply them in their everyday life, and thus reduce their memory difficulties. The programme consists of 6 units taught over a 14-session course, applied in groups of 8-10 people by one or two tutors working on skills such as attention, spatial and temporal orientation and verbal fluency. Participants are also taught specific strategies for improving visual and verbal memory, such as associated pairs, the chain method, the method of loci, categorization, and strategies for learning names and recalling numbers.

Procedure

The elderly people were assessed and participated in the memory training in two contexts of reference: Old People's Homes and the Psychological Care Service at the University of Granada. In the Old People's Homes, selection of participants took place initially on the basis of previous information from the directors of the homes themselves about residents who presented potentially early-dementia or dementia-risk symptoms, and for whom a fuller assessment and cognitive intervention were recommended. In the Psychological Care Service of the Psychology Faculty, participants were selected from among those who voluntarily enrolled on a programme of detection and intervention in relation to cognitive decline in the elderly. All participants were previously informed of the research objectives and participated totally voluntarily in the study.

All participants were assessed at three time points with the two instruments for the assessment of the treatment effects (MEC and working memory test). Thus, assessments took place before the memory training (pretest assessment); immediately after the memory training (post-test assessment); and 9 months after the memory training (follow-up assessment). Also, in the initial assessment of all participants they underwent an interview aimed at obtaining information about level of global functioning, so as to discard from the study those

with signs of depression and sensory or motor problems that could interfere in the research. Also excluded were those who in the initial assessment obtained an MEC score of less than 16 points.

Once the initial assessment had been made, only those in the treatment group participated in the memory training programme; those in the control group did not take part in any type of specific training. Sessions lasted one hour and took place twice a week over a 3-month period.

Design and statistical analysis

The design employed was quasi-experimental repeated-measures with non-equivalent control group. Within-group factor was measurement of the variables in the three assessments (pre-test, post-test and follow-up), while between-group factor was treatment group versus control group; covariable was initial cognitive status measured by the MEC. Dependent variables were participants' scores on the MEC tests (Lobo et al., 1979) and on the working memory test (Oakhill et al., 1989) in the successive assessments.

The statistical analyses were ANOVAS. We also analyzed the effect size (d) through within-group and between-group pairwise comparison between the successive assessments for each test of assessment of the treatment effects. All analyses were carried out using version 12.0 of the SPSS statistical program.

RESULTS

Below we present the results concerning the effects of a memory training programme on the scores in two tests assessing general cognitive performance and working memory.

In relation to the results for the *MEC test* (see Table 1 and Figure 1), the most important finding is that, although in the phase prior to the intervention there are no significant differences between those in the control group and those in the treatment group, these differences do emerge once the memory training has taken place; after this point we find significant differences between groups in favour of the treatment group, both immediately after the training and 9 months later. Thus, the results obtained in the statistical analyses carried out show that there are no significant within-subject differences in the MEC scores for the total sample ($F(2/96) = 1.270$; $p = 0.283$), while significant between-subjects differences are found for the different MEC assessments ($F(1/96) = 18.146$; $p<0.0001$), as well as a significant interaction due to treatment (factor (MEC score) X group (treatment vs control) interaction $F(1/95) = 9.592$; $p = 0.003$). Likewise, it should be pointed out that the effect of the initial MEC performance, taken as a covariant, does not emerge as significant ($F(1/95) = 2.792$; $p = 0.098$).

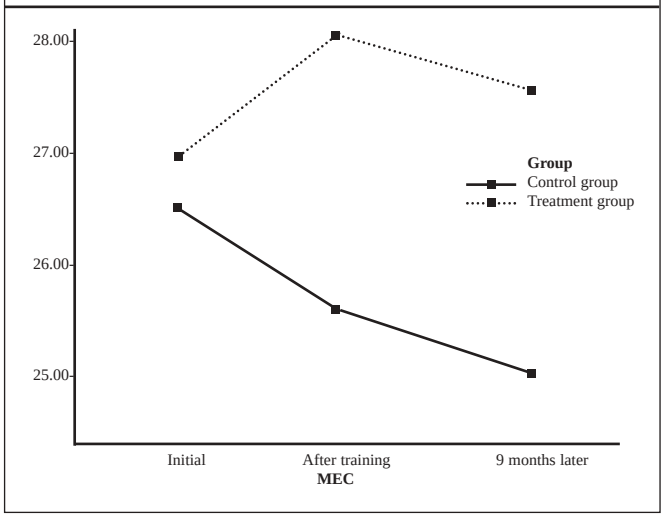
If we analyze the difference of means in the MEC test obtained by the participants at the different assessment points (see Table 2), the data show that in the treatment group there is a progressive increase in the score that is significant from the pre-test to the post-test (effect size (d) = -0.966). This result is especially relevant if we take into account that in the control group the effect is the opposite, that is, there is a significant decrease in the MEC score from the pre-test to the post-test (d = 1.143) and from the pre-test to the follow-up score (d = 1.543). Thus, the sum of effects of both groups (treatment and

Table 1
Mean scores on the MEC and ANOVAs for participants in the control/experimental groups by cognitive status

MEC TEST	Initial MEC	MEC after training	MEC 9 months later
TOTAL SAMPLE	Mean (s.d.)	Mean (s.d)	Mean (s.d)
Control grp.(n=39)	25.43 (5.22)	24.26 (5.96)	23.88 (6.33)
Treatment grp. (n=59)	27.63 (4.91)	28.59 (5.03) **	28.25 (5.46) **
WITH CD			
Control grp.(n=19)	21.71 (3.72)	19.95 (4.09)	20.5 (5.04)
Treatment grp. (n=22)	22.62 (3.68)	24.0 (4.55) **	24.0 (4.6) **
WITHOUT CD			
Control grp.(n=20)	29.18 (3.45)	27.57 (4.73)	27.0 (5.6)
Treatment grp.(n=37)	30.4 (2.79)	31.27 (3.1) **	30.78 (4.1) **

With CD: with cognitive decline / Without CD: without cognitive decline
** difference between control group and treatment group is significant at 0.01

Figure 1
Score on the MEC in the three assessment phases for the total sample



control) gives us a pretest/follow-up between-group effect size in the MEC of 2.072** (significant difference at 0.001).

We can observe, then, that while the total of those participating in the training improve their score on the MEC test after the programme and maintain the improvement a year after the initial assessment, those in the control group present a drop in their MEC scores at follow-up. This result is found regardless of baseline level of cognitive performance (initial MEC score).

Table 2
Difference of means and effect size, within-group, (pre-test, post-test and follow-up assessment) in the MEC test for total sample and for participants divided into control group and treatment group

Effect size between assessment phases in the MEC test	Total sample	Control group	Treatment group
Pre-test – post-test	0.04	1.143*	0.966*
Post-test – follow-up	0.379	0.400	-0.339
Pre-test – follow-up	0.485*	1.543*	-0.627*

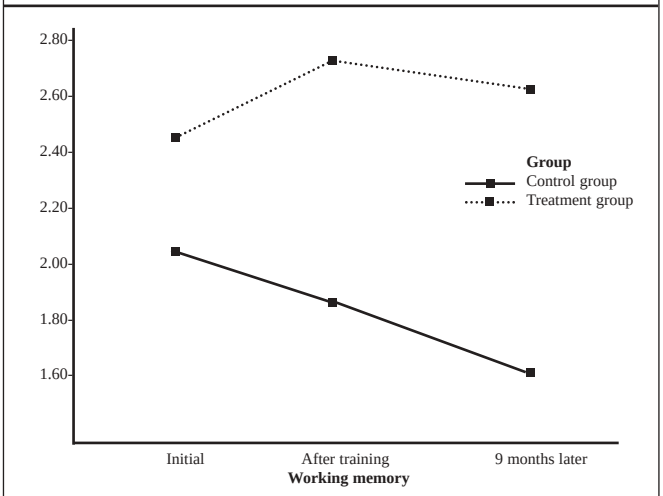
* difference of means is significant at the 0.05 level

Table 3
Mean scores on the working memory test and ANOVAs for the control/experimental group participants by cognitive status

WORKING MEMORY	Initial	After training	9 months later
TOTAL SAMPLE	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Control grp.(n=39)	2.03 (1.10)	1.91 (1.15)	1.63 (1.11)
Treatment grp. (n=59)	2.44 (1.09)	2.64 (1.10) **	2.62 (1.08) **
WITH DC			
Control grp.(n=19)	1.55 (0.84)	1.32 (0.83)	1.11 (0.81)
Treatment grp. (n=22)	1.92 (0.78)	1.92(0.78) *	1.95 (0.88) **
WITHOUT DC			
Control grp.(n=20)	2.51(1.1)	2.38 (1.1)	2.1(0.89)
G. Treatment grp. (n=37)	2.84(1.12)	3.05 (0.94) *	3.02 (0.98) **

With CD: with cognitive decline / Without CD: without cognitive decline
* difference between control group and treatment group is significant at 0.05
** difference between control group and treatment group is significant at 0.01

Figure 2
Score on the working memory test in the three assessment phases for the total sample



In the *working memory test* (Table 3 and Figure 2) the results are similar to those found in the case of the MEC. That is, while there are no significant differences between the control group and the treatment group prior to the intervention phase for either the total sample or the participants divided according to cognitive status, these differences do emerge after the cognitive intervention. Thus, the statistical analyses carried out show no significant within-subject differences in the working memory test for the total sample ($F(2/95) = 0.091$; $p = 0.764$). Nevertheless, significant differences were found in relation to treatment ($F(1,95)= 8.750$; $p<0.004$), as well as a significant interaction due to treatment (factor (working memory test score) X group (treatment vs. control) interaction $F(1/95) = 8.367$; $p = 0.005$). It should also be pointed out that the effect of the initial MEC performance, taken as a covariant, does not emerge as significant ($F(1/95) = 0.007$; $p=0.933$). Figure 2 clearly shows the results obtained in this variable.

Likewise, if we analyze the effect size (d) in the working memory test through pairwise comparison at the different assessment points (see Table 4) we find that although in the treatment group the increases in scores are not significant, in the control group there is indeed a significant decrease in the test score from post-test to follow-up ($d = 0.273$) and from pre-test to follow-up ($d = 0.394$). In this case, the sum of the effects means that the size of the between-group effects in the working memory test is 0.433* (significant difference at 0.05).

DISCUSSION AND CONCLUSIONS

With regard to the results obtained, the following aspects should be highlighted. Firstly, all those who participated in the memory training programmes

Table 4
Difference of means and effect size, within-group, (pre-test, post-test and follow-up assessment) in the working memory test for total sample and for participants divided into control group and treatment group

Effect size between assessment phases in the working memory test	Total sample	Control group	Treatment group
Pre-test – post-test	-0.038	0.121	-0.190
Post-test – follow-up	-0.148*	0.273 *	0.017
Pre-test – follow-up	0.110	0.394 *	0.172

* difference of means is significant at the 0.05 level

improved or maintained their cognitive performance both immediately after it and at the 9-month follow-up assessment; on the other hand, those who did not participate in the training showed a reduction in their scores on the two tests employed for their assessment. While no significant differences are observed at baseline in either of the two tests, differences do appear after the intervention phase. These effects found on analyzing the total sample are also observed when we divide the sample according to cognitive status. Thus, both those with and without cognitive decline who participated in the training programme succeeded in improving their scores on the tests employed, and maintained the improvement one year after the initial assessment. This is particularly relevant if we bear in mind that those with and without cognitive decline who did not participate in the training programme showed a drop in their scores which led to their losing significant ground on the treatment group after the intervention phase. That is, the cognitive training had the effect not only of initially improving cognitive performance in those participating in the treatment, but also of holding back cognitive decline in those participants.

Also, we should mention that even though we referred in the introduction to studies that demonstrated the effectiveness of memory-improvement programmes, such studies had certain defects, notably lack of a control group (e.g., the work of Yesavage, 1989, or De Vreese et al., 1998) and small sample sizes (e.g., Stigsdotter-Neely & Bäckman, 1995, Panza et al., 1996). Our study, however, has rectified both defects, and still shown positive significant effects of cognitive training both in those with cognitive decline and in those without it, effects that were maintained 9 months after the end of the intervention. In this regard we found particularly relevant the case of those with cognitive decline, since the intervention appears to succeed in maintaining and even improving cognitive performance in this group, which, as diverse studies (Petersen et al., 1999; Tuokko et al., 2003) have shown, has a high probability of developing dementia in the medium term.

Another interesting aspect to take into account in relation to the data obtained is the type of test used for measuring the efficacy of the intervention; given that our goal was to explore the effect of memory training on cognitive functioning, we chose tasks which – though memory-based (working memory test) or with a large memory component in their execution (MEC test) – are not directly related to the training provided, but rather designed to check the generalization of the effects between tasks. In this way we are able to show the effectiveness of the memory training with regard to diverse cognitive aspects associated with general cognitive ability (Verhaeguen, 2000).

In sum, the results obtained provide evidence that interventions aimed at stimulating and exercising cognitive abilities may help to counteract the negative effects of ageing.

To conclude, and in relation to the results, it seems clear that the positive effects of memory training programmes are not only observed after participation in them, but are also maintained in the long term (9 months after the treatment). This makes them, in our view, a highly relevant tool for intervention in relation to ageing, suggesting the need to oblige their inclusion in intervention protocols with this sector of the population.

REFERENCES

Auffray. C. & Juhel. J. (2001). Effets généraux et différentiels d´un programme d´entraînement cognitif multimodal chez la personne âgée. *L´Année Psychologique*. 101 . 63-89.

Bäckman. L. (1995). Utilizing compensatory task conditions for episodic memory in Alzheimer's disease. *Acta Neurologica Scandinavia*. 165. 109-113.

Calero. M.D.. Navarro. E. Robles. P. & García-Berbén. T. (2000). Estudio de validez del Mini-Examen-Cognitivo de Lobo et al para la detección del deterioro cognitivo asociado a demencias. *Neurología*. 15. 337-342.

De Vreese. L.. Belloi. L.. Iacono. S.. Finelli. C. & Neri. M. (1998). Memory training programs in memory complainers: efficacy on objective and subjective memory functioning. *Archives of Gerontology and Geriatrics*. 6. 141-154.

Dively. M. & Cadavid. C. (1999). *Memoria 65+. Programa de mejora de la memoria en personas mayores*. Madrid: Grupo Albor-Cohs. División Editorial.

Floyd. M. & Scogin. F. (1992). Effects of memory training on the subjective memory functioning and mental health of older adults: a meta-analysis. *Psychology and Aging*. 12. 150-161.

Folstein. M.F.. Folstein.. S.E. & McHugh. P.R. (1975). Mini-Mental-State. A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*. 12. 189-198.

Jodar. M. (1994). La memoria en la ancianidad: disminución y potenciación. *Ger Press*. 24. 1-3.

Lobo. A.. Ezquerra. J.. Gómez. F.. Sala. J. & Seva. A. (1979) El mini-examen cognoscitivo. Un test sencillo y práctico para detectar alteraciones intelectuales en pacientes médicos. *Actas Luso Españolas de Neurología y Psiquiatría*. 7. 189-201.

Manubens. J.. Martínez-Lage. P.. Martínez-Lage. J.. Larrumbe. R.. Muruzabal. J.. Martín. E.. et al. (1998). Variación de las puntuaciones en el Mini-Mental-State con la edad y el nivel educativo. Datos normalizados en la población mayor de 70 años de Pamplona. *Neurología*. 13. 111-119.

Montejo. P.. Montenegro. M.. Reinoso. A.. de Andrés. M. & Claver. M. (1999). Estudio de la eficacia de un programa de entrenamiento de memoria multicéntrico para mayores de 60 años. *Revista Española de Geriatría y Gerontología*. 34. 199-208.

Oakhill. J.. Yuill. N. & Parkin. A. (1989). Working memory. comprehension ability and the resolution of text anomaly. *British Journal of Psychology*. 80. 351-361.

Panza. F.. Solfrizzi. V.. Mastroianni. F.. Nardó. G.. Cigliola. F. & Capurso. A. (1996). A rehabilitation program for mild memory impairments. *Archives of Gerontology Geriatrics*. 5. 51-55.

Petersen. R.C.. Smith. G.. Waring. S.. Ivnik. R.. Tangalos. E. & Kokmen. E. (1999). Mild cognitive impairment: clinical characterization and outcome. *Archives of Neurology*. 56. 303-308.

Scogin. F. & Bienias. J. (1988). A three-year follow-up of older adult participants in a memory-skills training program. *Psychology and Aging*. 3. 334-337.

Stigsdotter-Neely. A. & Bäckman. L. (1995). Effects of multifactorial memory training in old age: generalizability across tasks and individuals. *Journal of Gerontology*. 50. P134-P140.

Tuokko. H.. Frerichs. R.. Graham. J.. Rockwood. K.. Kristjansson. B.. Fisk. J. et al. (2003). Five-year follow-up of cognitive impairment with no dementia. *Archives of Neurology*. 60. 577-582.

Verhaeghen. P.. Marcoen. A. & Goossens. L. (1992). Improving memory performance in the aged through mnemonic training: a meta-analytic study. *Psychology and Aging*. 7. 242-251.

Verhaeghen. P. (2000). The interplay of growth and decline. Theoretical and empirical aspects of plasticity of intellectual and memory performance in normal old age. In R.D. Hill. L. Backman & A. Stigsdotter (eds.). *Cognitive rehabilitation in old age*. (pp. 3-22). New York: Oxford University Press.

Vilalta. J.. Llinás. S.. López-Pousas. A.. Amiel. J. & Vidal. C. (1990). CAMDEX. Validación de la adaptación española. *Neurología*. 5. 117-120.

Wechsler. D. (1999). *Escala de Inteligencia de Wechsler para Adultos-III*. Madrid: TEA.

Yesavage. J. (1989). Techniques for cognitive training of memory in age-associated memory impairment. *Archives of Gerontology Geriatrics*. 1. 185-190.