Effect of long-term individual cognitive stimulation intervention for people with mild neurocognitive disorder

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Introduction. Cognitive stimulation may be beneficial in slowing the progression of mild neurocognitive disorder (NCD), but the results of existing research are inconsistent. Furthermore, there are no long-term interventions nor individual (one-on-one) interventions applied by professionals.

Objetive. The aim of this study was to assess the efficacy of a long-term individual cognitive stimulation intervention on people with mild NCD.

Patients and methods. A pre-post test design with a non-equivalent control group was conducted. A total of 82 participants with mild NCD were assigned to a cognitive stimulation intervention group or to a control group. The intervention consisted of 88 individual format sessions of approximately 45 minutes, twice per week. Independent evaluators assessed cognition, depressive symptomatology and autonomy level in activities of daily living at pre-intervention, intra-intervention (6 months) and post-intervention (12 months).

Results. At intra- and post-intervention, significant improvement on cognition and depressive symptomatology in the intervention group compared to the control group were found. Younger participants and those with better cognitive function and status in pre-intervention achieved better results. Adherence to the intervention was high.

Conclusions. Results suggest the efficacy of long-term individual cognitive intervention in people with mild NCD, which could delay the progression towards a major NCD.

Key words. Alzheimer´s disease. Cognitive impairment. Dementia. Depression. Older adults. Psychosocial intervention.

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Ethical approval
University of Santiago de Compostela (Spain) (Code number 9.12.2016).

Accepted:
17.05.21.

How to cite this article:
Justo-Henriques S, Otero P, Torres ÁJ, Vázquez FL. Effect of long-term individual cognitive stimulation intervention for people with mild neurocognitive disorder. Rev Neurol 2021; 73: 121-9. doi: 10.33588/rn.7304.2021114.

Versión en español disponible en neurologia.com.

Introduction

We are currently witnessing an unprecedented aging of the population. In Europe, 19.1% of the population is over 65 years old and demographic projections suggest that this figure will reach 35% in 2050 [1]. Portugal is the fourth country in the European Union with the highest percentage of elderly people (21.5%), which is estimated to continue increasing, reaching 37.2% in 2080 [2].

In this context, neurocognitive disorder (NCD), with a prevalence between 3% and 25%, is considered a public health issue [3]. The initial and less serious clinical condition is mild NCD, which is defined by evidence of modest cognitive impairment compared to a previous level of performance of the individual in one or more cognitive domains, without interference in the ability to perform the activities of daily living [4]. Being diagnosed with this disorder, increases the likelihood of developing a major NCD [5].

To prevent progression of mild NCD to major NCD, cognitive stimulation may be a path of hope, which is recommended by the Clinical Practice Guide of the National Institute for Health and Clinical Excellence (NICE) as a treatment of choice for people with mild and moderate dementia [6]. However, nine randomized controlled trials focused on people with mild NCD resulted in inconsistent findings. Six studies found a significant increase in the participants' cognitive function after the intervention compared to the control group [7-12]. Three studies failed to achieve a significant decrease in the cognitive impairment [13-15], and one of these [14] even found an increase in cognitive impairment.

Some limitations of these studies could limit the scope of the results. The sample size of three studies was small, ranging from 17 to 39 participants [7,8,13]. Only three studies had designed a systematic action plan through the elaboration of a protocol, an intervention manual and the training of therapists [10,11,15]. None of them assessed the adherence of the professionals to the protocol and only five performed a blind assessment of the results [8,10,11,12,15]. None of the studies used gamification to administer the intervention, which could increase the adherence to the intervention.

Most of the interventions (e.g., Alves et al [7]; Capotosto et al [13]) had a relatively short duration (average of 30 hours throughout 14-18 sessions), which may be insufficient to treat chronic and degenerative conditions such as NCD. None of the studies performed an individual intervention administered by a professional, although this would allow for a better adjustment to the pace of each person [16] and it would allow access to participants who are less likely to participate in group formats due to personal preferences, health or behavioral problems or fear of stigmatization. Lastly, only two studies [7,8] analyzed the predictors of the results or the adherence to the intervention, which could help optimize the interventions.

The main objective of this study was to assess the efficacy of a long-term individual cognitive stimulation intervention in patients with mild NCD. Secondary aims were: a) to analyze the effects of the intervention on depressive symptoms and the autonomy of daily life activities; b) to analyze which variables predict the results of the intervention; and c) to assess the adherence to and acceptability of the intervention.

Patients and methods

A quasi-experimental, pre-post-test design with a non-equivalent control group was conducted. A group of participants that received the intervention was compared with a group of participants with matched characteristics that did not receive the intervention. This study was reported in accordance with the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement [17].

Participants

The sample was of convenience and non-probabilistic. The participants were recruited among the users of the Cediara center (a non-profit psychosocial support organization for the elderly located in Ribeira de Fráguas) and from the census in Ribeira de Fráguas, both located in Albergaria-a-Velha, district of Aveiro (Portugal). The recruitment and implementation of the intervention were from January 2017 to July 2018.

The users of the Cediara center were successively selected and assigned to the intervention group, while people from the community paired to them in terms of gender, age, educational level and pre-intervention cognitive function were identified with the collaboration of the city council and the Health Center of Ribeira de Fráguas and were assigned to the control group.

To participate in the study, participants had to meet the following inclusion criteria: a) be 45 years of age or older; b) have a mild NCD according to the diagnostic criteria of DSM-5, diagnosed by a clinician less than two months ago; c) have a score between 10 and 24 in the Portuguese version of the *Mini Mental State Examination* (MMSE) [18]; and d) intend to participate in all intervention and assessment sessions. The exclusion criteria were: a) having received psychological or psychiatric treatment in the last two months; b) having a condition that needs immediate intervention (e.g., suicidal ideation) or interferes with participation in the study (e.g., severe hearing impairment); c) inability to communicate that affects the participation in the intervention, determined by the researchers; d) any medical condition that endangers the participant's survival in the next 12 months; e) future change of residence or social center in the next 12 months; and f) participating in another study.

Based on a previous study [10], it was estimated that a sample size of 34 participants per group would be sufficient to detect a mean difference of 1.14 between the experimental and control groups, assuming an α of 0.05 and a power $(1 - \beta)$ of 0.80. Allowing for a 17% attrition rate, the recruitment goal was 41 participants per group (82 total).

Of the 234 participants evaluated, 88 (37.6%) met the elegibility criteria and were invited to participate in the study. Of these, 6 (6.8%) refused to participate. Thus, the final sample consisted of 82 participants, who were assigned to a cognitive stimulation intervention group (n = 41) or to a control group (n = 41). A total of 6 participants (7.3%) dropped out of the study (Fig. 1).

Intervention

Prior to the intervention, a treatment protocol was created, a manual was developed, and a pilot study tested [19]. Two therapists with five to seven years of experience (previously trained during 160 hours by a clinician) administered the intervention. No significant differences between therapist in terms of results were found on MMSE (U = 18.5; z = −1.11; p = 0.269), Montreal Cognitive Assessment (MoCA) (U = 19.5; z = −0.99; p = 0.323), Geriatric Depression Scale-15 (GDS-15) (U = 28; z = 0; p = 1.000), nor Barthel's index (U = 22.5; z = −0.66; p = 0.513). Sessions were recorded, and adherence to the protocol was assessed by the clinician, obtaining a protocol adherence of 94%, indicating that the

main elements in the protocol were actually administered.

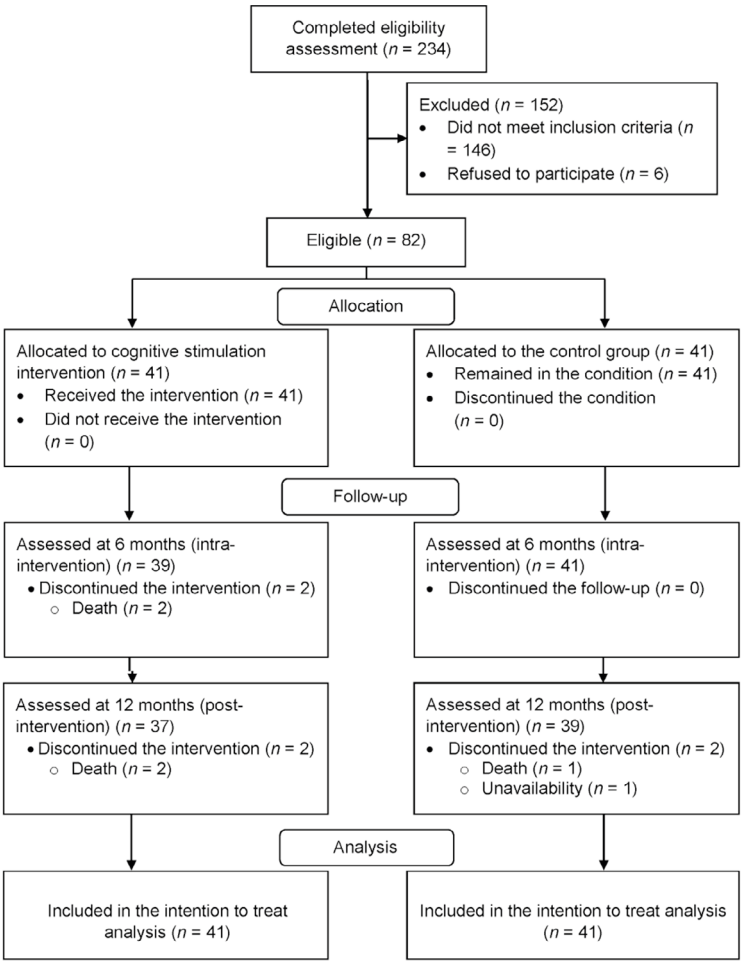
The intervention was based on the intervention by Apóstolo and Cardoso [20] which was adapted from the proven intervention by Spector et al [21], following the principles of application of cognitive stimulation therapy (person-centered, respect, participation, inclusion, choice, fun, maximize the potential, strengthen one-on-one social relationships between the therapist and each participant). This intervention is based on cognitive reserve [22], according to which cognitive reserves allow participants to maintain functionality despite brain changes caused by aging, and on neuroplasticity [23], whereby the brain has the ability to change as a result of experience.

The intervention consisted of 88 sessions of approximately 45 minutes, two times per week, and it was administered in an individual format. All sessions followed the same structure: welcoming the participants, reality orientation therapy, cognitive stimulation activity, return to calm and closure of the session [24]. Reality orientation therapy was included in all the sessions using a time and weather board, developed specifically for this intervention, composed of a set of information related to temporal references (day of the week, month, day of the month, year, season, time of the year and weather conditions). For the main cognitive stimulation component, two self-developed therapeutic tools in table format were used alternately each day of the two days of the intervention each week, Roletas da Memória© and Bingos Séniores©. Roletas da Memória© were composed of Portuguese roulette (including exercises to stimulate Portuguese language), Math roulette (math operations) and the Activities of Daily Living roulette (knowledge about activities of daily living). Bingos Séniores© was composed of Fruit Bingo (fruit images to stimulate short-term and semantic memory), the Trip to the Past Bingo (focused on reminiscing with images of the past, promoting episodic memory) and the Sounds Bingo (sounds to exercise sensory memory) (Table I). These themes were alternated through a schedule (the same for all participants) [24]. In this way, this intervention allowed the training of attention, memory, language, gnosia and executive functions.

This intervention followed the guidelines by Dreer et al [16] to maximize the success of interventions with elderly patients according to their neuropsychological functioning. This includes a greater frequency of sessions with shorter duration, a clear structure, adaptations to the rhythm of each participant and to the slow down speed of information processing.

Participants in the control group did not receive any intervention or any material. Although they were not restricted access to the treatment in their community if they considered it necessary for their cognitive impairment, no participant received a cognitive intervention.

Figure 1. Flow diagram.



Instruments

Independent evaluators previously trained, who did not know the objectives of the study and the condition assigned to each participant, performed assessments at pre-intervention (baseline), intra-intervention (6 months) and post-intervention (12 months). Sociodemographic variables were as-

Table I. Contents of the intervention.

		Contents/activities
Time and weather board		Fill in the board with elements related to temporal events (day of the week, month, day of the month, year, season, weather).
Roletas da Memória©	Portuguese language	Place cards with incomplete words in each of the eight parts that compose the roulette. Give the participant individual cards with the letters that compose the alphabet to select and place them in the missing letters; name synonyms or associated words; order alphabetically; memorize words; develop a theme.
	Math	Place cards with math operations with missing numbers in each of the eight parts that compose the roulette. Give the participant individual cards with different numbers to put them in the equation; math operations; order numbers; memorize numbers; simulate purchase operations.
	Activities of Daily Living	Based on a topic (e.g., clothing, food, medication), ask the participant to order the images accordingly; identify intrusive images; compare images according to certain categories (e.g., weight, cost); memorize and identify the changes.
Bingos Séniores©	Trip to the Past Bingo	Give a card with images from the past to the participant. Request the participant to identify each of the images and their differences compared to the present. Read the story "Trip to the Past", and identify the corresponding images. Build a story from an image, report how he/she lived a certain past moment.
	Fruit Bingo	Give the fruit Bingo card to the participant. Request the participant to identify each fruit on the card; read the story "The Fruit Dialogue", identifying the corresponding images. Add images, associate the fruits with the seasons, build a story, say riddles about the fruits.
	Sounds Bingo	Place the images on the table, play sounds. Ask the participant to identify the image corresponding to the heard sound. Group cards by categories (e.g., animals, musical instruments).

sessed using a questionnaire designed ad hoc for this study. Cognitive function was assessed through the MMSE (Folstein et al [25], 1975; Portuguese version by Guerreiro et al [18]), with a reliability of k = 0.98 and a Cronbach's α of 0.89 [26]. Cognitive status was assessed using the MoCA (Nasreddine et al [27], 2005; Portuguese version by Freitas et al [28]), with a Cronbach's α of 0.90 and test-retest reliability of 0.87 [29]. Depressive symptoms were evaluated through the GDS-15 (Yesavage et al [30]; Portuguese version by Apóstolo et al [31,32], with a Cronbach's α of 0.83. Autonomy in daily life activities was assessed through the BI (Mahoney et al [33]; Portuguese version by Araújo et al [34]), with a Cronbach's α of 0.96. Adherence and acceptability to treatment was assessed using ad hoc record sheets, registering the number of sessions attended, the degree of the participants' collaboration during the sessions and the participants' preference of the materials used.

Statistical analysis

Analysis of data were performed on an intention to treat basis and SPSS version 25.0 was used. Missing data were imputed by carrying the last observation forward. Descriptive statistics, chi-square test (or exact test of Fisher or Fisher-Freeman-Halton for expected values smaller than 5) and Student's *t*-test for independent samples were performed to analyze differences between groups at pre-intervention, and to report adherence to treatment. To analyze the effect of the intervention, repeated-measures analysis of variance (ANOVA) with condition as the inter-subject factor and time as intra-subject, was conducted. When time or time x condition was significant, post-hoc *t* tests with Bonferroni-corrected values and Cohen's *d* with confidence intervals were calculated. To analyze the predictors of the intervention's efficacy, multiple linear regression analyses were performed.

Ethical considerations

This study was conducted in accordance with the latest revision of the Declaration of Helsinki and obtained ethical approval from the University of Santiago de Compostela (Spain) (code number 9.12.2016). Participation was voluntary; all participants provided written informed consent.

Results

Participants' characteristics

The sociodemographic characteristics of the sample are presented in table II. The 70.7% of participants were women, with a mean of 79.3 years old. The 59.8% had no partner, 76.9% had from one to four years of primary education and 76.8% lived with a family member. Half of the sample had previously been homemakers and the 79.3% had an income ≤ 500 € per month. The etiology of the clinical diagnosis was Alzheimer's disease for the 82.9%. There were no significant differences between the intervention and the control groups on these variables at baseline.

Cognitive screening

Regarding cognitive function, the mean MMSE scores (and standard deviations) at pre-intervention, intra-intervention and post-intervention in the intervention and control groups are presented in figure 2. Condition was significant, $F(1, 80) = 7.59$, p

= 0.007, η^2_p = 0.09. Time was also a statistically significant factor, $F(1.43, 114.20) = 32.39$, $p < 0.001$, η^2_p = 0.29. In the intervention group, there were significant differences in cognitive function between pre- and intra-intervention: $t(40) = -7.57$, $p < 0.001$, d = 1.18, 95% CI (0.78, 1.58); and between pre- and post-intervention: $t(40) = -8.19$, $p < 0.001$, d = 1.28, 95% CI (0.86, 1.69). However, in the control group, no significant differences were found between pre- and intra-intervention: $t(40) = -0.08$, $p = 0.934$, d = 0.01, 95%, CI (–0.01, 0.08) or between pre- and post-intervention: $t(40) = 1.73$, $p = 0.091$, $d = 0.27$, 95% CI (–0.04, 0.58). The interaction time × condition was significant, $F(1.43, 114.20) = 44.75$, $p < 0.001$, $\eta^2_p = 0.36$. There were no significant differences between groups in cognitive function at baseline: $t(80)$ = -0.26, $p = 0.820$, $d = 0.05$, 95% CI (–0.38, 0.49); but there were significant improvements in the intervention group compared to the control group at both intra-: $t(80) = 2.95$, $p = 0.001$, $d = 0.74$, 95% CI (0.29, 1.19); and post-intervention: $t(80) = 3.85$, $p <$ 0.001, d=0.94), 95% CI (0.48, 1.39) (Table III).

Regarding cognitive status, the mean MoCA scores (and standard deviations) at pre-, intra- and post-intervention in both groups can be seen in figure 3. Statistically significant differences in condition were found, $F(1, 80) = 5.69$, $p = 0.019$, η^2_p = 0.07. Similarly, statistically significant differences in the time factor were found, $F(1.46, 116.43) = 21.08$, $p < 0.001$, $\eta^2_p = 0.21$. In the intervention group, there were significant differences in cognitive status between pre- and intra-intervention: $-t(40)$ = –7.14, $p < 0.001$, $d = 0.95$, 95% CI (–4.66, –2.61); and between pre- and post-intervention: $-t(40)$ = –5.71, $p < 0.001$, $d = 0.87$, 95% CI (–4.99, –2.38). In the control group, there were no significant differences between pre- and intra-intervention: $t(40)$ = 0.13, $p = 0.900$, $d = 0.01$, 95% CI (–0.72, 0.82), nor between pre- and post-intervention: $t(40) = 1.20$, p = 0.240, $d = 0.11$, 95% CI (–0.30, 1.18). The interaction time × condition was statistically significant, $F(1.46, 116.43) = 27.58$, $p < 0.001$, $\eta^2_p = 0.26$. There were no significant differences between groups at baseline in cognitive status: $t(80) = -0.79$, $p = 0.430$, $d = 0.17$, 95% CI (–0.26, 0.61); but a significant improvement was found in the intervention group compared to the control group at intra-intervention: $t(80) = 3.07$, $p = 0.001$, $d = 0.74$, 95% CI (0.29, 1.18), and post-intervention: $t(80) = 3.51$, $p = 0.001$, d=0.77, 95% CI (0.32, 1.21) (Table III).

Depressive symptomatology and level of autonomy

Regarding depressive symptomatology, the mean

Table II. Characteristics of the sample.

	Total *n* = 82 (%)	Intervention group *n* = 41 (%)	Control group *n* = 41 (%)
Gender			
Feminine	58 (70.7)	29 (70.7)	29 (70.7)
Masculine	24 (29.3)	12 (29.3)	12 (29.3)
Age			
M	79.3	79.5	79.0
SD	10	10.1	10.1
Interval	50-97	51-97	50-96
Marital status			
Without partner	49 (59.8)	28 (68.3)	21 (51.2)
With partner	33 (40.2)	13 (31.7)	20 (48.8)
Educational level			
No education	19 (23.2)	10 (24.4)	9 (22)
1 to 4 years of education	63 (76.8)	31 (75.6)	32 (78)
Housing situation			
Alone	19 (23.2)	10 (24.4)	9 (22)
Spouse	31 (37.8)	12 (29.3)	19 (46.3)
In aggregate	32 (39)	19 (46.3)	13 (31.7)
Previous profession			
Housework	41 (50)	22 (53.7)	19 (46.3)
Worked outside the house	41 (50)	19 (46.3)	22 (53.7)
Income			
Until 500 €	65 (79.3)	30 (73.2)	35 (85.4)
501 € to 750 €	11 (13.4)	7 (17.1)	4 (9.7)
Over 750 €	6 (7.3)	4 (9.7)	2 (4.9)
Etiological subtype diagnosis			
Alzheimer's disease	68 (82.9)	34 (82.9)	34 (82.9)
Vascular disease	4 (4.9)	2 (4.9)	2 (4.9)
Traumatic brain injury	3 (3.7)	1 (2.4)	2 (4.9)
Parkinson's disease	5 (6.1)	3 (7.4)	2 (4.9)
Other medical condition	2 (2.4)	1 (2.4)	1 (2.4)

Figure 2. Cognitive function.

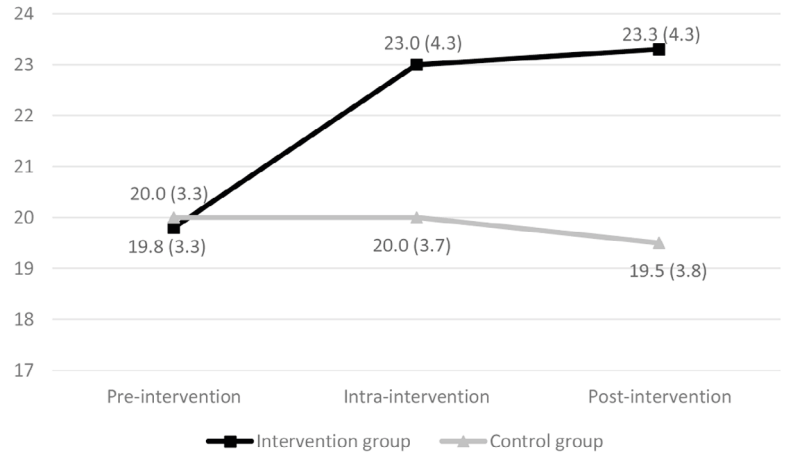
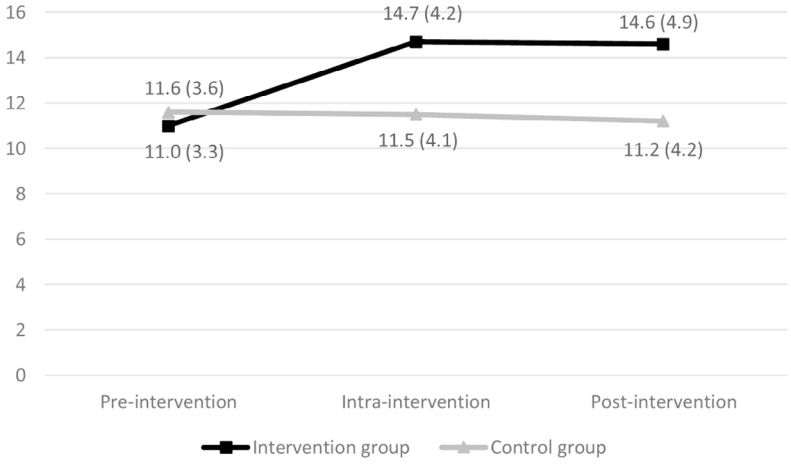


Figure 3. Cognitive status.



GDS-15 score in the intervention group was 6.9 (*SD* = 2.5) at pre-intervention, 5.6 (*SD* = 2.7) at intra-intervention and 5.7 (*SD* = 2.7) at post-intervention; corresponding values for the control group were 6.3 (*SD* = 2.8), 7.5 (*SD* = 2.8) and 8.2 (*SD* = 3.0). The condition factor showed statistically significant differences, $F(1, 80) = 6.05$, $p = 0.016$, $\eta^2_p = 0.70$. The time factor did not show significant differences, $F(1.79, 143.09) = 1.30$, $p = 0.273$, $\eta^2_p = 0.02$. However, significant differences were found in the time × condition interaction, $F(1.79, 143.09) = 23.58$, $p < 0.001$, $\eta^2_p = 0.23$. There were no significant differences between groups at baseline: $t(80) = 0.5$, $p = 0.620$, $d = 0.23$, 95% CI (−0.32, 0.54), but a significant reduction was found in the intervention group compared to the control group at intra-intervention: $t(80) = 1.93$, $p = 0.002$, $d = 0.70$, 95% CI (0.27, 1.14), and post-intervention: $-t(80) = 2.49$, $p < 0.001$, $d = 0.86$, 95% CI (0.43, 1.31) (Table III).

Regarding the level of autonomy, the mean IB score in the intervention group was 80.6 (*SD* = 22.1) at pre-intervention, 76.7 (*SD* = 23.3) at intra-intervention and 76.2 (*SD* = 24.6) at post-intervention; corresponding values in the control group were 83.5 (*SD* = 21.6), 83.5 (*SD* = 21.4) and 81.8 (*SD* = 22.7). There were no statistically significant differences in the condition factor, $F(1, 80) = 1.12$, $p = 0.294$, $\eta^2_p = 0.014$; in the time factor, $F(1.49, 119.12) = 2.93$, $p = .072$, $\eta^2_p = 0.035$; or in the time × condition interaction, $F(1.49, 119.12) = 1.08$, $p = 0.330$, $\eta^2_p = 0.013$.

Predictors

The best results in the cognitive function at post-intervention were obtained by younger participants (non-standardized beta coefficient = −0.15, $p = 0.001$) and participants with better cognitive function at baseline (non-standardized beta coefficient = 0.91, $p < 0.001$). Similarly, the best results in cognitive status were achieved by younger participants (non-standardized beta coefficient = −0.26, $p < 0.001$) and those with better cognitive status at pre-intervention (non-standardized beta coefficient = 0.70, $p = 0.001$).

Adherence and acceptability

The participants attended an average of 83.5 of the 88 sessions (90.2% attended more than 80 sessions). They collaborated in 99.7% of sessions, and preferred Roletas da Memória© (in 53.7% of the sessions) followed by Bingos Séniores© (in 40.1%).

Discussion

The present study assessed the efficacy of a long-term individual cognitive stimulation intervention in patients with mild NCD. The results indicated that the intervention group had significantly better cognitive function and cognitive status than the control group after the intervention, with moderate to large effect sizes. This is consistent with previous findings [7,9-12], although the only study that obtained an equally high effect size was the study by Mapelli et al [8]. Other studies did not find an effect

of cognitive stimulation interventions [13,15] or found greater cognitive impairment after the intervention [14]. One possible explanation for the effect size in the current study is the greater exposure to cognitive stimulation activities (1980 hours in total) compared to the average of 30 hours in previous studies. Furthermore, although six months after the beginning of the intervention (at intra-intervention) significant changes had already occurred in the intervention group, repetition and over-learning during six months could have helped to stabilize learnings. Connections trained extensively become stronger, allowing more lasting changes [35].

The effects of the intervention were also found among depressive symptomatology, which decreased in the intervention group compared to control group, with a moderate effect size at intra-intervention and a large at post-intervention. These results are better than those found in the study by Mapelli et al [8], in which no positive results were obtained. This is consistent with the scientific literature about the relationship between mild cognitive impairment and depressive symptoms [36].

The best predictors of cognitive function at post-intervention were age and pre-intervention cognitive function; while the best predictor of cognitive status were age and pre-intervention cognitive status. The fact that younger participants had larger changes in cognitive function can be explained by younger age is related to greater neuronal plasticity [37]. The finding that those with better cognitive function and cognitive status at baseline had better results is consistent with evidence that the earlier the psychological intervention starts the more likely the cognitive functions are preserved [38].

The adherence and acceptability of the intervention were high; the number of sessions attended and degree of collaboration from the participants were elevated. This may be because the sessions were administered in an individual format following the guidelines of Dreer et al [16], including a greater number of sessions with shorter duration, clear structure and reduced pace. In addition, the self-developed materials adapted to the target population and the gamification of the intervention made it attractive.

Conclusions

Some important implications can be derived from this study. These findings suggest the importance of an early intervention that slows down cognitive decline in people with mild NCD, and may prevent or

Table III. Results of t-tests and effect size in within-group and between-group effects[a].

	t (gl)	*p*	Cohen's *d*	95% CI	
				Lower limit	Upper limit
Tests of within-group effects					
Cognitive function					
Intervention group					
Pre-intervention - Intra-intervention	–7.57 (40)	<0.001	1.18	0.78	1.58
Pre-intervention - Post-intervention	–8.19 (40)	<0.001	1.28	0.86	1.69
Control group					
Pre-intervention - Intra-intervention	–0.08 (40)	0.934	0.01	–0,01	0.08
Pre-intervention - Post-intervention	1.73 (40)	0.091	0.27	–0.04	0.58
Cognitive status					
Intervention group					
Pre-intervention - Intra-intervention	–7.14 (40)	<0.001	0.95	–4.66	–2.61
Pre-intervention - Post-intervention	–5.71 (40)	<0.001	0.87	–4.99	–2.38
Control group					
Pre-intervention - Intra-intervention	0.13 (40)	0.900	0.01	–0.72	0.82
Pre-intervention - Post-intervention	1.20 (40)	0.240	0.11	–0.3	1.18
Tests of between-group effects					
Cognitive function					
Pre-intervention	–0.26 (80)	0.820	0.05	–0.38	0.49
Intra-intervention	2.95 (80)	0.001	0.74	0.29	1.19
Post-intervention	3.85 (80)	<0.001	0.94	0.48	1.39
Cognitive status					
Pre-intervention	–0.79 (80)	0.430	0.17	–0.26	0.61
Intra-intervention	3.07 (80)	0.001	0.74	0.29	1.18
Post-intervention	3.51 (80)	0.001	0.77	0.32	1.21
Depressive symptoms					
Pre-intervention	0.05 (80)	0.620	0.23	–0.32	0.54
Intra-intervention	1.93 (80)	0.002	0.7	0.27	1.14
Post-intervention	2.49 (80)	<0.001	0.86	0.43	1.31

95% CI: 95% confidence interval. [a] The mean difference is significant at the 0.025 level (adjusted for Bonferroni's multiple comparisons).

delay the progression to a major NCD, avoiding high personal, social and economic costs. Given the projections of increase in population aging and major NCD cases, these findings have a great relevance in the present and the future.

Nonetheless, this study has some limitations. The assignment of the participants to the experimental conditions was not random, although possible biases were controlled by matching participants' characteristics and verifying that both groups were equivalent at pre-intervention. Another limitation was the non-existence of a follow-up period. Future randomized controlled trial with long-term follow-up is needed.

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Efecto de la intervención de estimulación cognitiva individual de larga duración para personas con trastorno neurocognitivo leve

Introducción. La estimulación cognitiva puede ser beneficiosa para ralentizar la progresión del trastorno neurocognitivo (TNC) leve, pero los resultados de las investigaciones existentes son inconsistentes. Además, no existen intervenciones a largo plazo ni intervenciones individuales (uno a uno) aplicadas por profesionales.

Objetivo. El objetivo de este estudio fue evaluar la eficacia de una intervención de estimulación cognitiva individual de larga duración para personas con TNC leve.

Pacientes y métodos. Se llevó a cabo un diseño pretest-postest con un grupo control no equivalente. Un total de 82 participantes con TNC leve fueron asignados a un grupo de intervención de estimulación cognitiva o a un grupo control. La intervención consistió en 88 sesiones de formato individual de aproximadamente 45 minutos, dos veces por semana. Evaluadores independientes evaluaron la cognición, la sintomatología depresiva y el nivel de autonomía en las actividades de la vida diaria en la preintervención (línea base), la intraintervención (seis meses) y la postintervención (12 meses).

Resultados. En la intra- y la postintervención, se encontró una mejora significativa en la cognición y la sintomatología depresiva en el grupo de intervención en comparación con el grupo control. Los participantes más jóvenes y los que tenían una mejor función y estado cognitivo en la preintervención obtuvieron mejores resultados. La adhesión a la intervención fue alta.

Conclusiones. Los resultados sugieren la eficacia de una intervención cognitiva individual de larga duración para personas con TNC leve, que podría retrasar la progresión hacia un TNC mayor.

Palabras clave. Demencia. Depresión. Deterioro cognitivo. Enfermedad de Alzheimer. Intervención psicosocial. Personas mayores.