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Research Article

Cognitive Stimulation Therapy for Older Adults With Mild-to-Moderate Dementia in Italy: Effects on Cognitive Functioning, and on Emotional and Neuropsychiatric Symptoms

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Abstract

Objectives: Cognitive Stimulation Therapy (CST) is one of the most popular evidence-based interventions for people with dementia. The aim of the present study was to assess the effectiveness in the short- and long-term (on completing the treatment and 3 months later) of an Italian adaptation of the CST protocol (CST-IT).

Method: Older adults with mild-to-moderate dementia at 16 residential care homes were randomly assigned to a CST-IT group (N = 123) or an active control group (N = 102). The following domains were examined for potential benefits: general cognitive functioning (Mini-Mental State Examination [MMSE] and the Alzheimer's Disease Assessment Scale—Cognitive subscale [ADAS-Cog]), language (Narrative Language Test), mood and behavior (Cornell scale and Neuropsychiatric Inventory), everyday life functioning (Disability Assessment for Dementia), and quality of life (Quality of Life—Alzheimer's Disease scale).

Results: At both the short- and long-term assessments, the CST-IT group's MMSE scores remained stable, while the control group's scores decreased slightly from pretest to posttest and at follow-up. The CST-IT group also had short-term benefits in other cognitive measures (ADAS-Cog and Narrative Language Test) and mood and behavior measures, which were generally maintained at follow-up. No other differences were observed.

Discussion: The effectiveness of CST in sustaining cognitive and emotional functioning, and counteracting the progression of behavioral/neuropsychiatric symptoms in people with dementia was confirmed, and a long-term benefit was demonstrated. CST is a promising option for the treatment of people with dementia in clinical practice.

Keywords: Behavioral symptoms, Cognition, Cognitive stimulation, Dementia, Depression

The aging of the global population is making dementia a health, social, and financial emergency worldwide. Over 50 million people around the world are now living with dementia (Alzheimer's Disease International, 2019). Dementia syndromes are characterized by cognitive deficits in multiple domains, and daily living functional loss (American Psychiatric Association, 2013). Great efforts are consequently being made to develop interventions or therapies

for people with dementia (e.g., Piras et al., 2011). In the absence of effective, disease-modifying pharmacological therapies (e.g., Galimberti & Scarpini, 2012), more attention has been paid to nonpharmacological approaches to dementia, or psychosocial interventions (e.g., Woods et al., 2012). They can be a valuable alternative to medication for preserving cognitive functioning, managing cognitive and behavioral symptoms, and improving the quality of life for people with dementia and their carers (McDermott et al., 2018; Woods et al., 2012).

Among various psychosocial (e.g., cognitive, multistrategy, behavioral, and environmental) interventions suggested for people with dementia to date, those based on cognitive stimulation (CS) seem to be the most effective (McDermott et al., 2018; Woods et al., 2012). They engage individuals with dementia in a series of activities and discussions, usually in groups, to improve their cognitive and sociorelational functioning and their well-being (McDermott et al., 2018; Woods et al., 2012).

Among the available CS programs, Cognitive Stimulation Therapy (CST; Spector et al., 2003, 2006) is an evidence-based protocol (Spector et al., 2010), recommended for people with mild-to-moderate dementia by the National Institute for Health and Care Excellence (NICE, 2006, 2018), and is used in at least 29 countries around the world (Spector et al., 2019). The CST program consists of 14 twice-weekly themed and structured group sessions lasting about 45 min each. Using enjoyable activities, it stimulates various different cognitive skills (particularly language and executive functioning, spatial and temporal orientation, reminiscence, and retrieval of personal information) in people with dementia, combining a cognition-based approach with psychosocial and relational features. CST group sessions engage participants in various activities, taking a respectful and sensitive person-centered approach. These activities revolve around "gentle" reality orientation, reminiscence, and multisensory stimulation, with an emphasis on people's emotional, relational, and social skills (Woods et al., 2012).

There is now evidence that CST is effective, in the short term at least, in supporting general cognitive functioning, and the specific cognitive domains of language comprehension and narrative abilities (see Lobbia et al., 2019 for a review). It also seems to have a broader positive impact on dementia-related symptoms (e.g., behavioral disorders, depression), and on the quality of life and well-being of people with dementia (see Lobbia et al., 2019). Apart from the CST maintenance program (e.g., Orrell et al., 2014, 2017), no studies to our knowledge have examined whether these benefits are maintained in the long term.

The present multicenter controlled clinical trial aimed to ascertain the effectiveness of an Italian adaptation of the CST protocol devised by Spector and colleagues (CST-IT; Capotosto et al., 2017) on a large sample of people with mild-to-moderate dementia, both in the short-term (on completing the program) and, crucially, in the longer term (3 months later). The benefits of the CST-IT were assessed in the following domains: (a) general cognitive functioning with the Mini-Mental State Examination (MMSE; Folstein et al., 1975) and the Alzheimer's Disease Assessment Scale—Cognitive subscale (ADAS-Cog; Rosen et al., 1984), and narrative skills with the Narrative Language Test (Carlomagno et al., 2013), considered as primary outcomes; (b) mood and behavior (with the Cornell scale [Alexopoulos et al., 1988], and the Neuropsychiatric Inventory [NPI; Cummings et al., 1994]); (c) quality of life (with the Quality of Life—Alzheimer's Disease scale [QoL-AD; Logsdon et al., 1999]); and (d) everyday life functioning (with the Disability Assessment for Dementia [DAD] tool [De Vreese et al., 2008]), considered as secondary outcomes.

In line with previous evidence (see Lobbia et al., 2019), we expected to find improvements in our CST-IT group on traditional measures of general cognitive functioning straight after completing the treatment. A benefit was also expected in language abilities because they are targeted during the intervention, and previous research (see Lobbia et al., 2019) found positive effects of CST in the language domain. As for the other domains, changes were also envisaged in perceived quality of life and in mood and behavioral/neuropsychiatric symptoms, while no improvement was expected in everyday life functioning (see Lobbia et al., 2019). As the complexity of the activities presented during the CST sessions depends on participants' baseline MMSE scores, any potential improvement was considered after controlling for general cognitive functioning (i.e., baseline MMSE scores).

Potential longer-term benefits of CST (at 3 months after completing the program) were also explored for the first time. Given the progressive nature of cognitive impairment in dementia, maintaining baseline overall cognition was interpreted as evidence of a protective effect of the CST. As CST programs also promote social relationships and enrich participants' environment, effects known to strengthen neuronal resilience against changes occurring in natural aging and neurodegenerative diseases (Salmin et al., 2017), their expected benefits should also persist over time.

Method

Study Design

The study was designed as a single-blind (assessor blinding), multicenter, controlled clinical trial on CST for people with mild-to-moderate dementia. Blinding was done by concealing group allocation from posttreatment assessors.

Participants

Our sample was recruited through 16 Italian residential care homes or day centers (14 in northern and two in central-southern Italy) between 2014 and 2019. Eligibility was based on participants meeting the following criteria (e.g., Spector et al., 2003): (a) a diagnosis of major neurocognitive disorder

(of any etiological subtype) according to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders in the mild-to-moderate range, that is, MMSE score ≥14; (b) a Clinical Dementia Rating (Hughes et al., 1982) score of 1 or 2; (c) a satisfactory ability to understand and communicate; (d) no neurodevelopmental disorders, premorbid intellectual disabilities, or current physical illness/disability reported in patients' clinical documents that might interfere with their participation; (e) no severe behavioral symptoms (e.g., loud or constant talking, wandering, shouting, or aggression) that might interfere with their participation; and (f) no diagnosed comorbid psychiatric disorders (e.g., severe depression). These criteria must also be met to use and manage the material proposed in the intervention/control conditions.

After 230 eligible participants had been identified, five dropped out before the treatment started (one had a cerebral infarction, one died, two were discharged from the residential home, and one opted out). The final sample thus included 225 participants. Covariate adaptive randomization was used at each participating center to ensure that participants' characteristics (age, gender, years of formal education, and level of cognitive impairment) were as similar as possible across the study groups. In this randomization procedure, new participants are sequentially assigned to a given treatment group taking specific covariates and previous assignments of participants into account (Kalish & Begg, 1985; Suresh, 2011). As a result, 123 participants joined the CST-IT group, and 102 were assigned to the control group. One participant in the CST-IT group dropped out during the program, and 17 in the CST-IT group and 20 in the control group did not complete the follow-up assessment.

Given the matching procedure, the CST-IT group (N = 123) and active control group (N = 102) did not differ in terms of age (d = 0.26), years of education (d = 0.15), gender distribution (see Table 1 for descriptive statistics), or MMSE scores (see Table 2). The study was approved by the local research ethics committee for psychological research and the experimental procedure complied with the principles of the Declaration of Helsinki (1964 and later amendments; Rickham, 1964).

Outcome Measures

Primary outcome measures

General cognitive functioning

Mini-Mental State Examination.—There are items for testing temporal and spatial orientation, immediate and delayed verbal memory, language, attention, and praxis. The dependent variable was the total score (max. 30), corrected for age and education (Folstein et al., 1975).

Alzheimer's Disease Assessment Scale—Cognitive subscale.—This tool contains 11 tasks assessing orientation, memory, language, praxis, attention, and other cognitive abilities. The dependent variable was the total score

Table 1. Descriptive Statistics for the Sample's Demographics, and for Each Measure of Interest at Pretest, Posttest, and Follow-Up, by Group

	CST-IT group (N = 123) (30.89% male, 69.10% female)									Active control group (N = 102) (37.25% male, 62.74% female)								
	M		SD			Min–max				M		SD			Min–max			
Age	82.57			9.33		50–98				84.74			6.86		62–99			
Education	6.75			3.75		1–19				6.19			3.59		0–17			
	Pretest			Posttest			Follow-up			Pretest			Posttest			Follow-up		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
MMSE	123	20.17	4.02	123	21.06	4.45	106	20.68	4.55	102	19.90	3.92	101	18.67	4.14	81	18.29	4.25
ADAS-Cog	108	28.4	10.20	108	26.08	10.90	91	26.53	11.42	81	30.72	11.63	80	32.60	12.62	60	32.64	14.13
NLT	122	11.10	5.74	122	14.12	7.29	105	12.83	5.87	100	10.58	6.45	98	10.78	6.33	77	9.79	5.48
Cornell	123	6.07	5.63	123	4.16	4.38	106	5.04	4.99	102	4.86	4.61	101	5.80	5.71	81	5.23	5.02
NPI	123	11.77	13.41	123	8.93	10.91	106	13.44	15.7	102	8.90	11.90	101	11.20	16.14	81	12.10	18.09
DAD	84	54.26	24.04	84	53.50	24.74	69	53.59	22.83	57	48.36	23.86	56	43.75	24.51	39	42.10	25.34
QoL-AD	118	28.00	9.89	123	29.52	7.81	106	29.09	7.86	97	26.99	8.10	101	26.68	8.20	80	26.50	8.27

Note: ADAS-Cog = Alzheimer's Disease Assessment Scale—Cognitive subscale; DAD = Disability Assessment for Dementia; MMSE = Mini-Mental State Examination; NLT = Narrative Language Test; NPI = Neuropsychiatric Inventory; QoL-AD = Quality of Life—Alzheimer's Disease scale.

Table 2. Effect Sizes (*d*) of the Differences Between the CST-IT and Active Control Groups at Pretest, and Net Effect Sizes for the CST-IT Group vis-à-vis the Active Control Group

	d	Short-term gains	Long-term gains
MMSE	0.07	0.73	0.57
ADAS-Cog	−0.21	−0.70	−0.44
NLT	0.08	0.69	0.33
Cornell	0.23	−0.86	−0.54
NPI	0.22	−0.64	−0.23
DAD	0.24	0.29	0.23
QoL-AD	0.11	0.30	0.26

Note: ADAS-Cog = Alzheimer's Disease Assessment Scale—Cognitive subscale; DAD = Disability Assessment for Dementia; MMSE = Mini-Mental State Examination; NLT = Narrative Language Test; NPI = Neuropsychiatric Inventory; QoL-AD = Quality of Life—Alzheimer's Disease scale.

(max. 70), where higher scores indicate a more impaired cognitive functioning (Rosen et al., 1984).

Language

Narrative Language Test.—This examines textual competence and discourse information content, assessing narrative abilities in terms of the effective communication of information (Carlomagno et al., 2013). Participants are asked to describe a single figure (the "Picnic" picture in the Western Aphasia Battery [Kertesz, 1982]), and then sets of figures (two cartoon sequences used by Nicholas & Brookshire, 1993). Descriptions are recorded, transcribed verbatim, and segmented using correct information unit analysis (Nicholas & Brookshire, 1993), followed by a quantitative textual analysis (Marini & Carlomagno, 2004). The dependent variable was the sum of the correctly and accurately reported items.

Secondary outcome measures

Mood

Cornell scale.—This contains 19 items assessing signs and symptoms of major depression in individuals with dementia (Alexopoulos et al., 1988). Each item is rated for severity on a scale from 0 (absent) to 2 (severe). The dependent variable was the sum of the scores for the 19 items. Total scores below 6 indicate no significant depressive symptoms, those above 10 probable major depression, and those above 18 definite major depression.

Behavior

Neuropsychiatric Inventory.—This tool assesses 10 behavioral issues in dementia patients. The dependent variable was the total score (Frequency × Severity), which ranged from 1 to 12, with higher scores indicating more frequent and more severe behavioral problems (Cummings et al., 1994).

Activities of daily living

Disability Assessment for Dementia.—This covers basic, instrumental, and leisure activities in 10 areas, from personal hygiene to managing money and medicines (De Vreese et al., 2008). The items in each area assess the individual's ability in three dimensions: initiation (ability to decide and/or start an action); planning/organization (problem-solving and decision-making); and effective performance (ability to complete an action). The scores are: 1 (ability to perform the activity without help); 0 (inability to perform the activity); or N/A (activities never performed before the onset of the disease, or not performed in the past 2 weeks). The dependent variable was the total score (ignoring items scored as N/A), obtained from the sum of all the scores, and setting the total number of valid answers in proportion to 100.

Quality of life

Quality of Life—Alzheimer's Disease scale.—This scale includes 13 items assessing subjective components (e.g., perceived quality of life and psychological well-being) and objective components (e.g., behavioral competence and environment) of quality of life, rated by participants on a 4-point scale from 1 (poor) to 4 (excellent). The dependent variable was the sum of all the items, where higher scores indicate a better quality of life (Logsdon et al., 1999).

Procedure

All participants attended 20 sessions over a period of 23 weeks (see Figure 1). Six were individual sessions for pretest, posttest, and follow-up purposes, conducted by trained psychologists who did not participate in the treatment program, and they had no information on participants' group allocation. During the assessment sessions, participants were administered a comprehensive battery of tests and questionnaires to assess the treatment's effectiveness (see Figure 1). The other 14 were group sessions, during which the treatment group completed the CST-IT program, while the active control group engaged in alternative educational activities, as detailed below and summarized in Figure 1.

The CST-IT Program

The treatment group was administered the Italian adaptation (see Capotosto et al., 2017) of the original CST protocol developed by Spector and colleagues (2003, 2006). This consisted 14 structured group sessions, to be delivered twice a week for 7 weeks in small groups of seven to eight individuals. Each session was organized in the same way. It started with a 10-min introduction, which included a personalized welcome, discussing a name for the group and a theme song; discussing the day, month, year, weather, and time, and the name and address of the residential center, using a whiteboard; and discussing current affairs and

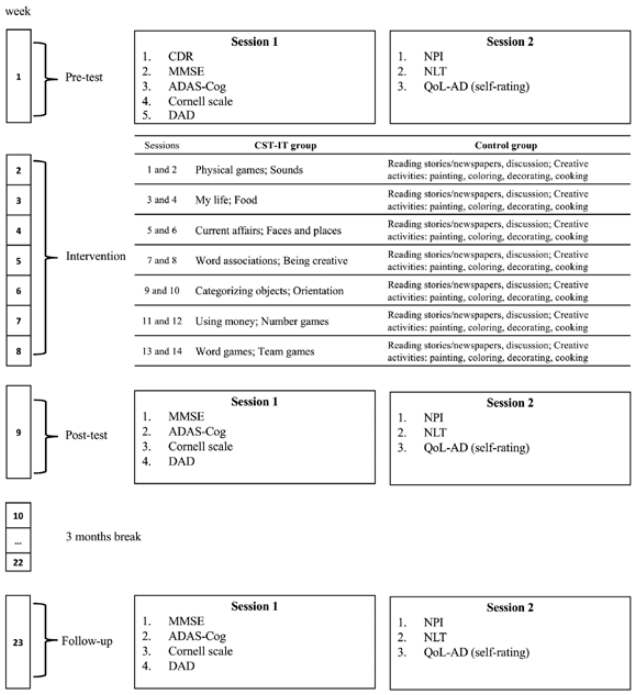

Figure 1. Activities for the Cognitive Stimulation Therapy—Italian adaptation (CST-IT) and active control groups. *Note*: ADAS-Cog = Alzheimer's Disease Assessment Scale—Cognitive subscale; CDR = Clinical Dementia Rating; DAD = Disability Assessment for Dementia; MMSE = Mini-Mental State Examination; NPI = Neuropsychiatric Inventory; QoL-AD = Quality of Life—Alzheimer's Disease scale.

refreshments. This was followed by the main CS activities, which took up 25 min. These activities were adapted to the participants' cognitive abilities and divided into level A (more difficult, for people with a MMSE of ≥19) and level B (easier, for people with a MMSE of 14–18). The last 10 min of the session were used to conclude, thanking everyone for attending and contributing, singing the theme song, reminding everyone of the day and time of the next session and its content, and saying goodbye.

The CST-IT program was delivered by two cofacilitators (one of them always a psychologist) who were members of staff at the participating centers. The primary facilitators in each pair had experience of dementia care and group facilitation skills. To take part in the study, at least one facilitator had to attend a 1-day training course on CST delivered by members of the CST-IT research group. This requirement was established to ensure a common approach and good practices in the conduction of the CST groups.

Activities for the active control group

The active control group attended the same number of group sessions as the treatment group, twice a week for 7 weeks, but engaged in the typical educational activities promoted by the residential care homes involved in the study. These activities included reading and discussing articles from national and local newspapers, or stories from books, and creative activities such as coloring, painting, decorating, or cooking (see Figure 1).

Statistical Analyses

Data were sought on every participant randomized. This involved including all participants irrespective of compliance, and whether or not they took part in all phases of the study. A mixed-effects approach was used, which enables estimates to be adjusted for repeated sampling and sampling imbalance, as well as for variations among individuals within the data (McElreath, 2020). This approach was used for each measure of interest, with Group (CST-IT group vs active control group), Assessment session (expressed as weeks: 0 [pretest] vs 9 [posttest] vs 23 [follow-up]), and baseline MMSE scores as predictors, and subjects and centers (N = 16) as random effects.[1] To focus on the probability of an effect given the observed data (posterior probability), the models were fitted using a Bayesian approach with the Markov Chain Monte Carlo estimation method implemented in STAN (Stan Development Team, 2017), coupled with the R packages rstan (Stan Development Team, 2019) and rstanarm (Goodrich et al., 2020; see Supplementary Material, Part 1, for a detailed description of the models tested for each measure of interest).

A model comparison strategy (Burnham & Anderson, 2003) was used first to identify the best model for each measure of interest (see Supplementary Material, Part 1, for further details). Then posterior distributions of the best model for each measure of interest were analyzed. Posterior distributions were summarized using posterior means and 90% credibility intervals (Kruschke & Liddell, 2018).

To clarify the dimension of immediate (pre- vs posttest) and long-term (pretest vs follow-up) gains in the CST-IT group after adjusting for the control group's performance, net effect sizes (see Weisz and Hawley, 2001) were computed for each outcome measure using the following formula: ([Posttest or follow-up for the trained group – Pretest for the trained group] – [Posttest or follow-up for the controls – Pretest for the controls])/(Pooled *SD* of the difference). We interpreted d = .20 as a "small" effect, d = .50 as a "medium" effect, and d = .80 or higher as a "large" effect, as Cohen (1988) suggested.

Results

The two groups did not differ at pretest in any of the measures considered (see Table 2 for descriptive statistics).

Figures 2 and 3 show the plots of the predictions and random effects for the best models as regards the primary and secondary outcome measures, respectively.

Additional information on how the models were compared and how the best model was identified for

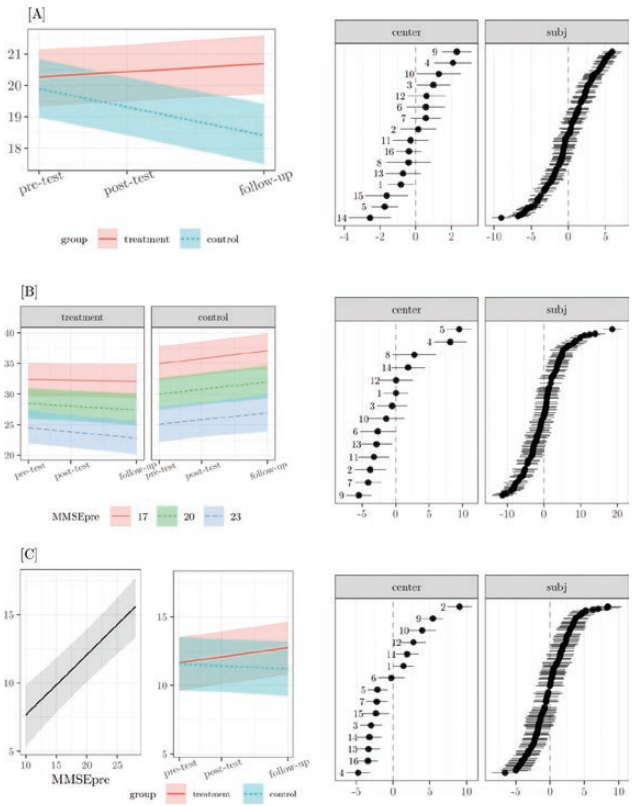

Figure 2. Plots of the best model's predictions and random effects for the primary outcome measures. (A) Mini-Mental State Examination; (B) Alzheimer's Disease Assessment Scale—Cognitive subscale; (C) Narrative Language Test. *Note*: Treatment: CST-IT group; Control: active control group; MMSEpre: MMSE score at baseline; sbj: subject. For each measure, the plot on the left represents the conditional effects of predictors on the dependent variable. Straight lines are the predicted values and colored bands indicate the 90% credible intervals of the model predictions, i.e., the interval containing 90% of the posterior distribution values, which is a measure of the degree of certainty about values estimated depending on the observed data. The plot on the right represents the random effects of the model—only for the treatment group, expressed as so-called Best Linear Unbiased Predictors (BLUPS; Pinheiro & Bates, 2000). In more detail, each point represents the difference between the model intercept and the (CST-IT) subject or center intercepts (with 90% credible intervals). Based on this representation, the variability between subjects and between different centers can be seen directly, summarized in the random variance parameters of the model.

each measure of interest is available in Supplementary Material, Part 2.

Primary Outcome Measures

General cognitive functioning

For the MMSE scores, the best model was obtained with the Assessment session × Group interaction, with random subject and center intercepts. This model was only about one time as plausible as the next one, however (see Supplementary Material, Part 2). The CST-IT group retained the same performance from pretest to posttest and at follow-up, while the active control group's performance deteriorated slightly from pretest to posttest and at follow-up (see Figure 2A).

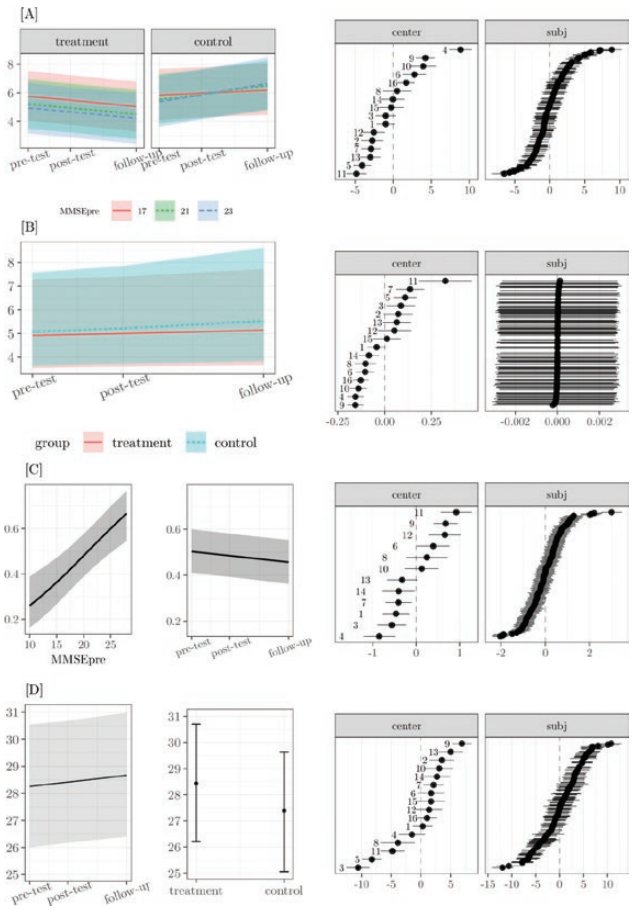

Figure 3. Plots of the best model's predictions and random effects for the secondary outcome measures. (A) Cornell scale; (B) Neuropsychiatric Inventory; (C) Disability Assessment for Dementia; (D) Quality of Life—Alzheimer's Disease scale. *Note*: Treatment: CST-IT group; Control: active control group; MMSEpre: MMSE score at baseline; sbj: subject. See note to Figure 2 for further details.

For the ADAS-Cog scores, the best model was given by the Assessment session × Group × MMSE (pretest score) interaction, with random subject and center intercepts. The model was about three times more plausible than the next one—judging from the evidence (see Supplementary Material, Part 2). Participants in the CST-IT group with higher pretest MMSE scores had lower scores (indicating a better performance) on the ADAS-Cog from pretest to posttest and at follow-up, whereas the active control group's scores rose slightly (suggesting a slight decline in their performance) from pretest to posttest and at follow-up (see Figure 2B).

Language

For the Narrative Language Test, the best model was the one including the pretest MMSE score as a main effect, the Assessment session × Group interaction, and random

subject and center intercepts. This model was about twice as plausible as the next one (see Supplementary Material, Part 2). Participants scoring higher in the pretest MMSE performed better in the Narrative Language Test, regardless of group or assessment session. The CST-IT group performed better at posttest than at pretest, and preserved this gain at follow-up. No changes were seen for the active control group (see Figure 2C).

Secondary outcome measures

Mood

For the Cornell scale, the best model was given by the Assessment session × Group × Pretest MMSE score interaction, with random subject and center intercepts. The model was about three times more plausible than the next one (see Supplementary Material, Part 2). The CST-IT group's scores on the Cornell scale decreased (i.e., there was a decrease in depression symptoms) slightly from pretest to posttest and at follow-up. Participants in the treatment group who scored lower on the pretest MMSE obtained higher scores on the Cornell scale than those with a better baseline general cognitive functioning. No changes emerged for the active control group (see Figure 3A).

Behavior

For the NPI scores, the best model was given by the Assessment session × Group interaction with random subject and center intercepts. The model was about 1.5 times more plausible than the next one (see Supplementary Material, Part 2). Participants in the CST-IT group retained the same scores from pretest to posttest and at follow-up, whereas the active control group's scores rose slightly from pretest to posttest and at follow-up (see Figure 3B).

Activities of daily living

For the DAD, the most plausible model was the one including the pretest MMSE score and Assessment session as main effects, and random subject and center intercepts. This model was about twice as plausible as the next one (see Supplementary Material, Part 2). Participants with higher MMSE scores had higher DAD scores, which decreased slightly at posttest and follow-up, regardless of group (see Figure 3C).

Quality of life

For the QoL-AD, the best model was given by the Assessment session and Group as main effects, with random subject and center intercepts. This model was only about one time as plausible as the next one, however (see Supplementary Material, Part 2). The QoL-AD scores increased slightly (indicating a better quality of life) from pretest to posttest, and at follow-up in both groups. Scores for the CST-IT group were somewhat higher than those for the active control group, particularly at posttest and follow-up (see Figure 3D).

Net effect sizes

Effect sizes, after adjusting for the control group's performance, were as follows (see Table 2): medium for the MMSE at both the short- and long-term assessments; large at posttest and medium at follow-up for the Cornell scale; medium at posttest and small at follow-up for the ADAS-Cog, the Narrative Language Test, and the NPI; and small at both time points for the DAD and the QoL-AD.

Discussion

The CST (Spector et al., 2003, 2006) is a specific program for people with dementia, used in various countries. There is accumulating evidence of its positive effect on cognition, emotional, and behavioral functioning, and quality of life. The present multicenter controlled clinical trial was conducted to assess the efficacy of the Italian version of the protocol in several domains, that is, general cognitive functioning and language (considered as primary outcome measures), and mood, behavior, everyday life functioning, and quality of life (considered as secondary outcome measures). Crucially, we were able to demonstrate not only short-term benefits—as classically examined in CST studies (see Lobbia et al., 2019), and most of those using CS activities (see McDermott et al., 2018, Woods et al. 2012)—but also longer-term positive effects (3 months after completing the program). The potential long-term benefits of CST had not been examined before, and this was seen as a strong limitation of CST studies. CST activities differ, depending on participants' MMSE scores (see Capotosto et al., 2017), so their scores were input as a predictor in the model tested here. This is another aspect not thoroughly examined in previous studies. Subjects and centers were also included as random effects in our model to control for any difference between the samples and the characteristics of the various centers (given the multicenter nature of our study).

Our results regarding general cognitive functioning are generally in line with our expectations, and with previous evidence (see Lobbia et al., 2019). They show that participants attending the CST-IT program remained stable, and even improved on general cognitive functioning measures in the short term. The CST-IT group's MMSE performance remained the same at posttest, whereas the control group's deteriorated. In the ADAS-Cog, the CST-IT group (and especially participants with higher baseline MMSE scores) showed an improvement, while the active control group did not. The former group's short-term benefits were also confirmed in the longer term, for both general cognitive functioning outcome measures. Our findings contrast with previous reports (e.g., Aguirre et al., 2013; Spector et al., 2001, 2003; but see Capotosto et al., 2017), possibly because the different pattern of changes detected using the MMSE and ADAS-Cog could be due to the different

nature of these two measures. The ADAS-Cog is a more comprehensive multidimensional scale than the MMSE. The latter is considered a more general measure, more suitable for detecting changes occurring in later stages of dementia (Ashford et al., 1995) than improvements achieved by cognitive interventions like CST (see also Huntley et al., 2015). Because the two measures assess different domains, future studies should make an effort to specify the impact of the CST in each of them. That said, the protective effect of the CST-IT on general cognitive functioning (as demonstrated here with the MMSE) is noteworthy, bearing in mind the progressive nature of cognitive impairment in dementia. It suggests that CST can sustain cognitive functioning and counteract an individual's gradual cognitive decline (over a period of 3 months, at least), possibly by strengthening participants' resilience to changes occurring in the course of dementia. It also shows that people with dementia whose MMSE is higher at the baseline (MMSE > 23) benefit more from CST in the longer term. This result has some important implications for clinical practice, suggesting that CST should be administered to people with early dementia (when their general cognitive functioning is less impaired).

As concerns language skills, participants in both our groups with higher pretest MMSE scores had better narrative abilities, in line with previous findings (see Spector et al., 2010). Language performance improved in the short term in the CST-IT group, but not in controls, and this benefit persisted at follow-up. This improvement could stem from the very nature of CST activities, which are designed to promote verbal competence and communication skills (Lobbia et al., 2019). While previous studies measured language proficiency in terms of assessor-rated overall communication ability, or using the language subscales of batteries assessing overall cognitive functioning (see Spector et al., 2010), we considered quantitative measures of participants' narrative organization and informativeness in connected language samples. Our results thus support the claim that CST is particularly suitable for sustaining communication skills in people with dementia (see Hall et al., 2013). The main effect of the MMSE score also indicated that individuals in both of our groups scoring higher for general cognitive functioning at the baseline were more informative when referential discourse was elicited. As was to be expected, this pattern of results suggests that narrative production (especially using sequential pictures) relies on the interaction between basic language skills and several other mental abilities (Lima et al., 2014). The CST-IT program may sustain the latter abilities too, thereby prompting the posttreatment changes observed in our participants' narrative abilities.

Our results regarding mood and behavior (the Cornell scale and NPI, respectively) showed that participants' depressive symptoms, and the severity and frequency of their behavioral/neuropsychiatric symptoms did not increase in the CST group during the study, whereas they did in the control group. This finding is in line with other studies using the same protocol (see Lobbia et al., 2019; Marinho et al., 2020), and confirms that the CST-IT activities foster positive interactions, reinforcing the personhood of people with dementia, and possibly sustaining their mood and preventing behavioral symptoms. Interestingly, depressive symptoms increased more in control participants with lower baseline MMSE scores (MMSE < 17), confirming, here again, the association between lower scores on cognitive abilities, general mental state, and depression, even in the early stages of dementia (Ganguli et al., 2006).

No benefits of the CST-IT were seen in everyday life functioning, as expected and in line with previous evidence (Lobbia et al., 2019). Considering the main effects of session (with an overall decrease in DAD scores in both groups) and general cognitive functioning at the baseline, higher baseline MMSE scores coincided with higher DAD scores. This may be because CST activities are designed to broadly stimulate cognitive and social skills. They do not focus on improving basic or instrumental activities of daily living, as measured here with the DAD (see Clare & Woods, 2004).

Finally, contrary to our expectations, QoL-AD improved as a function of assessment session, and in both groups, although the CST-IT group scored their quality of life higher than controls. Previous studies found no such benefits of the CST on quality of life (Lobbia et al., 2019). It may be that our findings stem from the person-centered care approach adopted by the centers involved in our study, and by our facilitators (who had been appropriately trained, and they conducted the activities with the control groups too). Future studies should strive to further clarify the effects of CST on the different dimensions of quality of life, also considering potential moderators (see Woods et al., 2006).

Even if a mixed-effects approach was used to ascertain potential benefits of the CST-IT program, a general limitation of this study lies in that any moderating effect of neuropsychiatric symptoms on the benefits of CST-IT was not assessed. Future studies should further examine whether other variables relating to the individuals (e.g., age, gender and education, but also motivation), and their dementia (e.g., etiology, time since onset, and medication use) might affect individual response to CST. Despite the quite large size of our sample and the covariate adaptive randomization adopted, we could not guarantee balanced groups within additional strata (e.g., equal proportions of patients with vascular dementia in the CST-IT and control groups), and thereby obtain a more nuanced picture of the factors influencing the benefits of CST-IT. Future studies should also make the effort to obtain similar sample sizes across outcome measures, which was not the case in the present investigation due to the long time taken to complete the whole battery and participant compliance issues. A thorough assessment could examine the benefits

of the intervention accurately, but have the disadvantage of being too demanding—especially for people with dementia—and thus impinge on their motivation to complete all the tasks.

Another potential limitation of our study lies in the use of very general cognitive measures like the ADAS-Cog, which is more suitable as a research tool than for neuropsychological testing. It also fails to address practical cognitive skills (Meneghetti et al., 2014; Mitolo et al., 2017), which may influence functioning. On the other hand, our use of quantitative measures of narrative abilities enabled us to demonstrate the positive effects of the CST-IT on participants' communication skills (partially overcoming the previously mentioned limitation). Future studies should try to examine maintenance effects after longer time intervals, though it is hard to choose an ideal interval after completing the intervention—an issue that deserves to be investigated in future studies. It is worth noting, however, that the longer term effects reported here seem encouraging (given that >5 months elapsed between the pretest and follow-up sessions).

Conclusion

Overall, the present findings demonstrate that the CST protocol is effective in Italian people with dementia, also in the longer term. It seems to counteract, and potentially delay, the progression of general and specific cognitive deficits (in communication skills), mood issues, and behavioral/neuropsychiatric symptoms in people with mild-to-moderate dementia. The overall low attrition of the intervention, and its consequent ready acceptance, also further underscores the value of this treatment and its feasibility in the setting of residential care homes.

It should be noted, however, that the effect sizes reported here (medium at posttest, but small for all measures at follow-up—except for a medium effect in the MMSE and NPI) point to the need to follow up the program (see Spector et al., 2003) with a maintenance protocol (Orrell et al., 2014) in order to raise the chances of achieving enduring benefits.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None declared.

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Author Note

[1]Given the highly skewed distributions of the NPI scores, a generalized mixed-effects model with the gamma family and inverse link functions was used for this variable. A generalized mixed-effects model with the beta family was used for the DAD scores variable because they represent a proportion.

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