



Effects of cognitive stimulation therapy Japanese version (CST-J) for people with dementia: a single-blind, controlled clinical trial

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Objectives: Cognitive stimulation therapy (CST) has shown to have significant benefits in improving the cognitive function and quality of life (QOL) in people with mild-to-moderate dementia in a UK randomized controlled trial (RCT). We developed and examined the Japanese version of group CST (CST-J) in a single-blind, controlled clinical trial.

Method: CST-J consisting of 14 sessions was administered to a treatment group ($n = 26$) twice a week for 7 weeks. The treatment group was compared with a control group ($n = 30$). Based on single-blindness, cognition was evaluated by a researcher, and QOL and mood were rated by the participants themselves. Additionally, QOL and mood of participants were rated by care workers who were not blind but who observed them most directly in their daily life (important for social validity).

Results: A linear mixed model was used for analyses of cognition and QOL. There were significant improvements in cognition [COGNISTAT (Neurobehavioral Cognitive Status Examination) and MMSE (Mini-Mental State Examination)] for the treatment group compared with the control group ($p < 0.01$). Regarding QOL, the EQ-5D was significant ($p = 0.019$) and the QoL-AD (Quality of Life - Alzheimer's Disease) showed a positive trend ($p = 0.06$) when rated by care workers, although not when rated by the participants themselves. Using a nonparametrical analysis, there were significant improvements in the face scale for mood when rated by both the participants ($p < 0.01$) and the care workers ($p = 0.017$).

Conclusion: The CST-J shows promising improvements in cognition, mood, and aspects of QOL for people with dementia in Japanese care settings. A large RCT is now needed.

Keywords: nonpharmacological therapy; long-term care; day program; intention-to-treat analysis

Introduction

In 2010, Alzheimer's Disease International (ADI) estimated 35.6 million people with dementia, with the numbers nearly doubling every 20 years, to 65.7 million in 2030 and 115.4 million in 2050 (Alzheimer's Disease International [ADI], 2010). Dementia care is therefore one of the most important health problems globally. Due to limitations in the efficacy of pharmacological approaches (e.g., Food and Drug Administration, 2005; Birks, 2006), nonpharmacological approaches for people with dementia are receiving considerable attention year by year.

There are several systematic reviews on non-pharmacological approaches (e.g., Cooper et al., 2012; Livingston, Johnston, Katona, Paton, & Lyketsos, 2005; Olazarán et al., 2010). These articles concluded that cognitive stimulation (CS) is an approach with a high-grade recommendation. CS describes engagement in a range of activities and discussions aimed at the general enhancement of cognitive functioning (Clare & Woods, 2004).

Probably, the most widely used CS program is cognitive stimulation therapy (CST), an evidenced-based brief program that Dr Spector and colleagues in the United Kingdom developed based on their previous systematic

review (Spector et al., 1998). CST consists of 14 sessions that include various topics such as word association, object categorization, discussion of current affairs, and orientation. Each session begins with introductions and warm-up activities. These include the singing of a chosen song and orientation, through referring to an orientation board and discussion of the date and topical issues (Spector et al., 2003). Targets of the program are people with mild-to-moderate dementia. Although CST is based on complex principles of learning (including multisensory methods, stimulation of language and executive functioning), material is presented in a game-like manner with the aim of subtle, implicit stimulation and avoiding people feeling that they are being 'taught' (Spector, Orrell, Davies, & Woods, 2001). It builds on principles of person-centered care, emphasizing the importance of treating people with dementia as individual adults, with much to contribute when staff are able to recognize their 'personhood' (Kitwood, 1997; Woods, 1999).

Regarding the effects of CST, a multicenter randomized controlled trial (RCT) including 201 participants showed a significant benefit for the treatment group compared with controls in both cognitive function and quality

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of life (QOL) (Spector et al., 2003) and was shown to be cost-effective (Knapp et al., 2006). The UK government guidelines (National Institute for Health and Clinical Excellence and the Social Care Institute for Excellence [NICE-SCIE], 2006) recommend the regular use of CS for mild and moderate dementia. CST much influenced subsequent studies of CS (e.g., Eckroth-Bucher & Sibe-rski, 2009; Vidovich, Shaw, Flicker, & Almeida, 2011).

In Japan, no government agencies have created any integrated guideline of nonpharmacological approaches for people with dementia, compatible with the UK guidelines. Instead, the Japanese Society of Neurology (2010) developed such a guideline with the cooperation of six other related Japanese academic societies. This guideline describes that any nonpharmacological approaches have not shown clear effectiveness in Japan. Moreover, the guideline indicates that very few structured studies of nonpharmacological approaches have been conducted in Japan.

As for research of CS in Japan, two studies examined the cognitive effectiveness of their program (Matsuda, 2007; Matsuda et al., 2010). Each study showed that patients treated with CS and donepezil improved significantly more than patients treated with donepezil alone, in nonrandomized controlled studies. However, these studies were individually administrated, focusing on outpatients with very mild dementia in clinical settings. Furthermore, single-blind assessment and intention-to-treat analysis were not conducted in either study.

In this study, we developed the Japanese version of group CST (CST-J) by translating and following the manual created by Spector et al. (2003). Therefore, we examined the effects of the program for Japanese people with mild-to-moderate dementia in long-term residential care settings with a single-blind, controlled clinical trial and also included the intention-to-treat analysis as per the original UK study.

Method

Participants

Three residential homes and one nursing home in the Tokyo metropolitan area collaborated in our study. Eligibility was based on the following criteria, according to the previous research (Spector et al., 2003):

- (1) A diagnosis of dementia in the mild-to-moderate range [a score of 10 or above on the Mini-Mental State Examination (MMSE)].

- (2) Some ability to communicate, which we judged by the patients' understanding of the assessor's instructions during the baseline assessment.
- (3) An ability to see and hear well enough to participate in the group.
- (4) No learning disability and/or current physical illness/disability that could affect their participation.
- (5) No severe behavioral and psychological symptoms of dementia, such as severe wandering, that could affect their participation.

Design

We estimated that a sample size of 26 in each group was required to achieve 0.4 effect size, 0.05 alpha error probability, and 0.8 power using G*power version 3.0 (Faul, Erdfelder, & Buchner, 2007). This assumed that we would use repeated-measures analyses of variance (ANOVAs). Fifty-six eligible participants were collected based on the previous criteria and the current estimation of the sample size.

Alternative allocation was used by each institution to divide participants into the treatment group or the control group. The method is given by Higgins and Green (2011) as one classification of a controlled clinical trial. Consequently, 26 participants were allocated to the treatment group and 30 to the control group. Regarding the concealment of the allocation, the first author kept the password-protected data file in a locked filing cabinet.

Table 1 shows the age, sex, Clinical Dementia Rating (CDR; Hughes, Berg, Danziger, Coben, & Martin, 1982) score, and number of participants who were prescribed a cholinesterase inhibitor (ChEI), for both the treatment group and the control group. These variables were not significantly different between the two groups.

The institutions that collaborated in our study had not previously administered any concrete interventions or participated in any other research prior to this study. We asked them not to execute any new interventions or take part in any other research for the duration of this study. Moreover, we requested the institutions to continue with usual group activities while this study ran. These group activities generally included daily short stretching exercises for about 10 minutes and events set such as annual events and birthday parties. Moreover, volunteers irregularly provided some activities such as listening to music, singing, and arts for the residents. In addition, we asked them to keep the allocation blind to the blind assessor (YK).

Table 1. Characteristics of participants at baseline assessments.

Characteristics	Treatment group ($n = 26$)	Control group ($n = 30$)	All ($n = 56$)	Between group
Age (years): mean (SD)	84.12 (5.52)	83.73 (6.44)	83.91 (5.98)	$Z = -0.13, p = 0.895$
Female:male ratio	3.33: 1 (20, 6)	4.00: 1 (24, 6)	3.67: 1 (44, 12)	$\chi^2 = 0.08, p = 0.780$
CDR score: mean (SD)	1.17 (.49)	1.37 (.63)	1.28 (.57)	$Z = 1.01, p = 0.315$
Medication: nonmedication ratio*	0.30: 1 (6, 20)	0.30: 1 (7, 23)	0.30: 1 (13, 43)	$\chi^2 = 0.00, p = 0.982$

*Cholinesterase inhibitor.

Assessment measures

Based on single-blindness, cognition was evaluated by a researcher, and the quality of life (QOL) and mood were rated by the participants themselves before and after the intervention. Additionally, the QOL and mood of the participants were rated by care workers who were not blind but who observed them most directly in daily life.

Cognition

Cognitive abilities were evaluated using the MMSE (Folstein, Folstein, & McHugh, 1975) and the Neurobehavioral Cognitive Status Examination (COGNISTAT; Northern California Neurobehavioral Group, 1995). The MMSE is a brief, internationally used test of cognitive function, with a maximum score of 30 points. COGNISTAT is also widely used and consists of 10 subscales: orientation, attention, comprehension, repetition, naming, construction, memory, calculation, similarities, and judgment. We used the Japanese version of COGNISTAT, which was developed and the reliability and validity were established (Matsuda & Nakatani, 2004). The sum score of standardized COGNISTAT subscales ranges from 23 to 105, with higher scores indicating better functioning. Of the two tests, we regarded COGNISTAT as a primary outcome measure of cognitive abilities because it is more complex and multidimensional. In addition, cognitive performance is likely to be influenced by delirium superimposed on dementia. Therefore, cognitive tests were not administered when levels of consciousness tended to be low: the time just after sleeping or eating, or evening time. Moreover, the assessor confirmed if the participants were 'alert' regarding their levels of consciousness as the first check item in COGNISTAT in each cognitive test.

Quality of life (QOL)

The Quality of Life - Alzheimer's Disease scale (QoL-AD; Logsdon, Gibbons, McCurry, & Teri, 1999) and the self-administered health index of EQ-5D (EuroQol Group, 1990) were used as participants' QOL measurements. QoL-AD is a brief, self-reported and disease-specific questionnaire. The scale includes 13 domains with good validity and reliability (Thorgrimsen et al., 2003). The total score ranges from 13 to 52, with higher scores indicating better functioning. EQ-5D is the internationally used scale of the health-related quality of life. We used the utility scores based on the patterns of each item's score, which range from -0.01 to 1.000. A Japanese version of QoL-AD was developed by Matsui et al. (2006), and the Japanese EuroQol Translation Team (1998) developed the EQ-5D for Japan.

Mood

To assess mood, we used a face scale that Lorish and Maisiak (1986) developed and Tabira et al. (2002) modified. This scale was originally developed to assess depressive mood (Lorish & Maisiak, 1986). It was

important to assess the mood between pre- and post periods of the treatment because it was recently reported that the prevalence of depressive symptoms in AD patients was 25% (Van der Mussele et al., 2012).

On the scale, participants were requested to select one face best expressing their recent general mood among the five faces with different facial expressions. The score ranges from 1 to 5, with higher scores indicating better functioning. We considered that the face scale was easier for people with dementia to rate visually and intuitively than other scales.

QOL and mood are subjective, primarily rated by participants. However, it is often difficult for people with dementia to be aware of their own conditions (Clare, 2008). For this reason, these scales were compensatorily rated by their care workers as proxies in addition to the participants themselves. Moreover, the rating by care workers has another implication. Particularly in applied behavioral analysis, it is important to check whether any change in participants' due to interventions are recognized by others, which is called 'social validity' (Wolf, 1978). We, however, regarded self-rated tests as primary outcome measures for the QOL and mood tests.

Blindness

This study was single-blind. An assessor (YK) and the participants were blind regarding the allocation. However, the therapist (first author) and the care workers in the institutions who additionally rated the QOL and mood of the participants were not blind, which was a major limitation in this study.

After all postintervention assessments, the κ value for agreement between the actual allocation and the allocation guessed by the blind assessor was examined to confirm if the blinding was successful.

Program

It is important for CST-J to be translated and culturally adapted based on some framework. Regarding assessments, particularly in cognitive tests, such frameworks have already begun to be made (Steis & Schrauf, 2009). Though there have not been such frameworks in non-pharmacological approaches yet, some frameworks should be made, referring to those for assessments. However, it is thought that the process for interventions, particularly regarding activity-based approaches such as CST, is not necessarily the same as that for assessments. One of the reasons is that activities included in the original CST are basically examples based on the theme of each session. Therefore, the process to translate and culturally adapt it for CST-J was made based on the following principles:

- (1) Directly translate the original program to Japanese (translation by three experts).
- (2) Administer a pilot study to Japanese people with dementia on the basis of the translation.

- (3) Amend unfamiliar and unsuitable sections for the Japanese situation as a result of the pilot study. Make samples of alternative activities that are thought to be close to the original ones according to each theme and purpose of each session.
- (4) Re-administer a pilot study. Adopt alternative activities that appear to fit to the Japanese situation from the results.

According to these principles, the original manual was translated into Japanese by the first author, YK, and TA. Based on the translation, a pilot study was administered, which revealed that it was necessary to modify the contents of eight sessions that seemed to be unsuitable as regards Japanese culture. Table 2 shows such modifications. For instance, crossword puzzles in the 13th session of word games were not very familiar in Japanese culture. Therefore, they were altered to 'Shiritori,' which is a

Japanese traditional word-chain game. The modifications were discussed and developed by the translators. The remaining six sessions were unchanged. We confirmed the suitability of the modified contents (e.g., The participants could understand 'Shiritori' more easily than crossword puzzles) through a second pilot study before we completed the CST-J.

For the treatment group, the completed program was conducted by the first author, in small group settings, twice a week for about 45 minutes per session over 7 weeks. Each small group was run in a room where no other residents were present.

The study protocol was approved by the Ethics Committee of Human Sciences of the University of Tsukuba, Japan, and the residential homes and the nursing home. Informed consent was obtained from both the participants and their relatives as the proxy. If they agreed to participate after an explanation of the study, they were asked to sign a consent form.

Table 2. Modifications from original program.

Session	Theme	Reasons for modifications	Modifications
1	Physical games	(No modification)	
2	Sounds	One of the original activities was to play music using percussion instruments that most Japanese participants were unfamiliar with.	Beating one's hands to music was added for such participants unfamiliar with play instruments.
3	Childhood	(No modification)	
4	Food	Using replicas of foods seemed childish to Japanese participants. Furthermore, it was very difficult for them to think of a menu according to an aim, foods, and the budget shown by a facilitator. This was especially difficult for Japanese men as they were not familiar with food shopping and cooking.	Advertisements of foods from supermarkets were used for thinking of a menu instead of food replicas. Some foods more familiar to men, such as nibbles for drinks, were added.
5	Current affairs	(No modification)	
6	Faces/scenes	Some participants seemed dissatisfied with only discussing the characteristics of pictures of faces. They seemed not to understand the purpose of only discussion and were bored.	Quizzes to guess whose parts of faces photos were, were added according to the aim of this session for stimulating attention and recognition of faces.
7	Word associations	(No modification)	
8	Being creative	Gardening was a very difficult activity in the situation of Japanese nursing homes and residential homes.	Other activities in the manual are plentiful. Therefore, gardening was deleted.
9	Categorizing objects	20 or so objects or colored pictures of objects were too many for some of the participants to categorize because of less capacity of their attention.	The number of objects or colored pictures of objects was adjusted according to the attention span of participants.
10	Orientation	(No modification)	
11	Using money	It was difficult and not enjoyable to guess prices of common objects without any cues. In addition, it was very difficult for Japanese participants to ask questions regarding salary, from the view of privacy.	Quizzes to guess more or less than the price shown as a cue were added. Instead of salary, some use of spending money, pocket money, or pin money were discussed.
12	Number games	Snap was almost unknown in Japanese culture. Moreover, high-low card games and bingo were too simple and were not satisfying.	According to the aim of this session for stimulating feeling, knowledge, and processing of numbers, quizzes using numbers were combined with high-low card games and bingo. Furthermore, instead of Snap, to say the multiplication tables as a group was added, which seemed to be important for the previous aim and enjoyable for Japanese elderly.
13	Word games	The Hangman game was almost unknown in Japanese culture. Moreover, crossword puzzles were unfamiliar among most Japanese elderly.	According to the aim of stimulating verbal reasoning, the Hangman game was changed to detective quizzes based on three-step hints. In addition, crossword puzzles were changed to 'Shiritori,' which is very popular in Japan.
14	Team quiz	(No modification)	

Results

Analyses

One treatment participant dropped out due to illness. Furthermore, two treatment participants partially refused post-intervention assessment. Regarding the control group, six participants partially refused postintervention assessment. We analyzed all parametric data of allocated samples based on the intention-to-treat model. Because of the missing values, the linear mixed model (Brown & Prescott, 1999) with ‘group’ (treatment group vs. control group) as the between-group factor and ‘intervention period’ (baseline vs. follow-up) as the within-group factor was applied for analyses of continuous variables (MMSE, COGNISTAT, EQ-5D, and QoL-AD). Significant interactions (group \times intervention period) suggested treatment effects in the analysis. Regarding the face scale of mood, which was nonparametric, a Mann–Whitney test was conducted to verify whether the change score between the treatment group and the control group was significantly different. Descriptive and inferential statistics were computed using IBM SPSS Statistics for Windows 19.0 (SPSS, 2010).

Key findings

Table 3 shows the summary of results of cognitive and QOL tests. Regarding cognition, the interactions of group \times intervention period were significant for both COGNISTAT and MMSE: $p = 0.00005$; $p = 0.003$, respectively.

As for QOL, the interactions of group \times intervention period were not significant for either QoL-AD or EQ-5D rated by participants themselves: $p = 0.673$; $p = 0.781$, respectively. Regarding the rating by proxies, however, it was a trend toward an improvement in QoL-AD ($p = 0.060$). Furthermore, the interaction of group \times intervention period of EQ-5D was significant ($p = 0.019$).

Table 4 shows the change scores between pre- and post periods regarding both the treatment group and the control group on the face scale for mood. For both participants’ self- and proxies rating, each Mann–Whitney test indicated significantly more change in the treatment group than that in the control group: $p = 0.009$; $p = 0.017$, respectively.

Integrity of the blind assessor

A κ value for agreement between the actual allocation and that guessed by a blind assessor was -0.044 . This low

Table 4. Results of change between pre- and post scores of the face scale for mood.

Efficacy measure	Change from baseline		Mann–Whitney test
	Treatment: mean (SD)	Control: mean (SD)	
Face scale (mood) (self)	0.52 (0.96)	−0.24 (0.87)	$Z = -2.62$, $p = 0.009$
Face scale (mood) (proxy)	0.20 (0.91)	−0.10 (0.89)	$Z = -2.39$, $p = 0.017$

value indicated that the blinding of the assessor was satisfactory.

Discussion

Summary of results

This study was mainly analyzed using the intention-to-treat model except for nonparametric data on mood. As a result, the treatment group showed improvements compared with the control group in cognitive function, QOL, and mood, except the self-rated QOL by a single blind assessment. Therefore, it was concluded from this controlled clinical trial that CST shows promising short-term effectiveness for Japanese long-term residential care settings, although the therapy was developed within a British context. This study suggests that sufficient modifications to the content through pilot studies will enable different cultures, such as Japan, to adopt CST.

Comparison with past research

CST-J showed a significant effect for cognitive function, similar to the original study (Spector et al., 2003). It is generally thought that some abilities are impaired, but others are still intact in people with dementia. For example, people with Alzheimer’s disease (AD) notably show lower episodic memory function from the early stage (Overman & Becker, 2005), but some other functions such as semantic memory or procedural memory are still intact (Garrard, Patterson, & Hodges., 2005; Mochizuki-Kawai et al., 2004). Furthermore, people with dementia have individual differences in degrees of both impaired and intact abilities. It is thought that CST stimulates each

Table 3. Results of cognitive tests and QOL tests.

Efficacy measure	Pretest		Posttest		Between-group \times within-group interaction
	Treatment: mean (SE)	Control: mean (SE)	Treatment: mean (SE)	Control: mean (SE)	
Cognitive tests					
COGNISTAT	65.42 (2.78)	64.77 (2.59)	72.26 (2.80)	64.35 (2.59)	$F = 19.68$, $p = 0.00005$
MMSE	17.00 (0.83)	16.87 (0.77)	18.63 (0.83)	16.47 (0.77)	$F = 9.80$, $p = 0.003$
QOL tests					
QoL-AD (self)	28.40 (1.19)	28.62 (1.17)	28.59 (1.19)	28.19 (1.20)	$F = 0.18$, $p = 0.673$
EQ-5D* (self)	0.74 (0.05)	0.81 (0.04)	0.74 (0.05)	0.80 (0.05)	$F = 0.08$, $p = 0.781$
QoL-AD (proxy)	27.69 (1.01)	29.07 (0.94)	28.65 (1.02)	28.13 (0.94)	$F = 3.69$, $p = 0.060$
EQ-5D* (proxy)	0.62 (0.04)	0.59 (0.04)	0.65 (0.04)	0.54 (0.04)	$F = 5.87$, $p = 0.019$

*The utility score was used for analysis of EQ-5D.

individual's intact abilities naturally and repeatedly through social group activities involving fun rather than training for people with more progressed dementia.

However, the nonsignificant result of the self-rated QoL-AD was different from the significant result of that in the original developmental study of CST (Spector et al., 2003). We suggest a possible reason for the difference related to Japanese feeling and expression of QOL. For instance, subjective well-being, which is suggested to impact on QOL (Ballesteros, 2007), has been reported to vary between cultures, with the trend in Japan being quite different from that in the United Kingdom (Gallup, 2010). Further studies indicated that Japanese have characteristics such as being self-critical and other-enhancing biases in the interdependent construction of self, which could be related to Japanese low well-being (Heine & Lehman, 1997; Karasawa, 1997; Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997). Therefore, it is suggested that therapists need more time and effort to change Japanese participants' QOL scores using a short-term program such as CST-J.

Interestingly, in this study, the difference of QOL between the treatment group and the control group could be perceived by the care workers as proxies. The EQ-5D was significant and the QoL-AD showed a positive trend when rated by the proxies. The results may have been influenced by evaluative bias, as they were not rated blindly. However, it is important from the point of social validity (Wolf, 1978); that is, it seems meaningful that the extent of the effect of the treatment was noticeable for care workers as proxies and observers, because they were nearest to the participants.

Moreover, the positive change in the self-rated mood suggested that it might be a precursor for changing QOL, even over a limited time period before true QOL changes become apparent. The prevalence of significant depressive symptoms in AD patients is reported to be higher compared with mild cognitive impairment (MCI) patients (Van der Mussele et al., 2012), which indicates that AD patients increasingly have depressive symptoms after onset. If so, it should be clinically significant that participants could improve or keep their daily mood through enjoying CST, which particularly seems to place great importance on social interactions among CS programs.

CST programs have flexible activities that therapists can select in each session according to participants' opinions or preferences, to some extent. Regarding the original program of CST, an individual version (iCST) is being developed for people for whom it is difficult to attend group activities (Orrell et al., 2012). Therefore, CST has been applicable to more varied situations. For these reasons, it is important that this program be applied in more countries.

Limitations

The sample size of our study was small compared with that of the original study, and statistical power was not examined. In addition, the treatment was conducted by

one therapist. Therefore, generalization between many therapists was not shown. Regarding the rating of QOL, it is recently indicated that discrepancies in QOL perception between people with dementia and their caregiver should be recognized, particularly in cases of more severe dementia (Buckley et al., 2012). The reason for the discrepancy and the validity of either rating by the patients themselves and their proxies has not been sufficiently explained yet. Therefore, we should give careful consideration to the result of QOL. Moreover, we should have taken account of unifying time, place, and activities before or after the evaluation of the face scale of mood, because it is generally considered susceptible to chance and confounding variables.

Implications for practice

To date, CST has been confused with CS in Japan, although CST is an original program developed by Spector et al. (2003) and has since been the basis for consequent CS studies. To further complicate the issue, the distinction between CS and CT (cognitive training), which were clearly defined by Clare and Woods (2004), is not apparent in many Japanese studies. Therefore, it is of utmost importance for Japanese practitioners to understand the background and definitions of the original CST, CS, and CT studies and to clear up the confusion. This study could contribute to a solution for the Japanese problem. Furthermore, the manual of CST-J has been already completed and is available to Japanese practitioners. Because the program was modified for Japanese culture, it will now provide an invaluable resource in a wide range of settings in Japan. It is important that a system of support and supervision for people running CST groups is established. For example, a culturally appropriate CST-J program could be implemented in homes, allowing residents to maintain cognitive functions and mood, enjoying such sessions while at the same time providing measureable indicators for assessors.

Future research

This program of CST-J should be tested as an RCT. The generalization between different therapists should be examined concurrently with a larger sample size. Given the rapid worldwide increase in people with dementia, as described above, it is most crucial to establish any effective standard programs of daily activities for people with dementia in long-term residential care settings that can be used anywhere in the world. Globally, it will be increasingly important for researchers to more directly exchange ideas and opinions regarding nonpharmacological approaches for people with dementia through common programs by translating and following the manual. CST is accessible in natural long-term residential care settings to even general care staff, as well as to specialized therapists such as psychologists, in terms of the paradigm, materials, and procedure. For this reason, this program may be effective in different countries if it is basically modified according to each culture.

Conclusions

CST-J showed improvements in cognitive function, QOL, and mood, except the self-rated QOL, by a single-blind assessment. The nonsignificant result of the self-rated QOL might be influenced by some cultural factors. However, the improvement in QOL rated by the care workers as proxies provides some social validity. Therefore, it can be concluded that CST-J shows promising short-term effectiveness for Japanese long-term residential care settings.

Declaration of Interests: None.

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Authors' contributors

K. Yamanaka designed the study, translated CST to Japanese, developed CST-J, administered the intervention, carried out the statistical analysis, and wrote the paper. Y. Kawano translated CST to Japanese and collected the data by blind assessment. D. Noguchi assisted the intervention as a co-leader and helped in writing the paper. S. Nakaaki assisted with the design, statistical analysis, and writing of the paper. N. Watanabe assisted with the design, statistical analysis, and writing of the paper. T. Amano translated CST to Japanese and developed CST-J. A. Spector supervised the study as the original developer of CST and edited several versions of the paper.

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