

## RESEARCH ARTICLE

# A Systematic Review of Cognitive Stimulation Therapy for Older Adults with Mild to Moderate Dementia: An Occupational Therapy Perspective

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### Abstract

In response to the need for effective non-pharmacological approaches for individuals with mild to moderate dementia, cognitive stimulation therapy (CST) interventions aim to optimize cognitive function. The present literature review explored the effectiveness of CST and the congruence of this approach with occupational therapy. Twenty-four databases and 13 “grey” sources were searched. Relevant papers were analysed using the McMaster Critical Literature Review Guidelines, the Modified Jadad Quality Scale and the Oxford Centre for Evidence-based Medicine Levels of Evidence Scale. To establish the congruence of CST with occupational therapy, themes were identified using the International Classification of Functioning and professional values outlined by the Canadian Association of Occupational Therapists. Twelve studies demonstrated a trend towards delayed cognitive decline following CST. This intervention strategy is congruent with occupational therapy values and may provide a useful structural framework to build rehabilitation programmes for this population. Psychometric properties of the McMaster Guidelines have not yet been established, and there is no standardized way to extract quantitative data from this measure. There is a need for further research exploring outcomes of CST interventions within the context of everyday function in individuals experiencing cognitive decline. Copyright © 2011 John Wiley & Sons, Ltd.

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### Keywords

cognitive stimulation therapy (CST); dementia; systematic literature review; geriatric occupational therapy

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## Introduction

### Prevalence and impact of dementia

It has been well established that the proportion of individuals 65 years or older is increasing in most industrialized countries. As populations age, it is expected that the global burden of dementia will continue to escalate. Worldwide, there are over 24 million individuals who have dementia, and by

the year 2040, this is predicted to increase to an alarming 81 million (ADI, 2005). Prevalence rates tend to vary across regions and are dependent upon diagnostic criteria utilized. In North America, for example, the prevalence of dementia in individuals 65 years or older ranges from 6 to 10%, a rate that doubles when milder cases are considered (Mathers & Leonardi, 2000). The cost of caring for this population is expected to reach \$604bn (US) in 2010 worldwide;

70% of this cost occurs in North America and Western Europe (Wilmo & Prince, 2010).

The International Classification of Diseases, 10th revision (ICD-10) describes dementia as a syndrome typically characterized by chronic, often progressive disturbances in higher cognitive functions including memory, thought processing, orientation, comprehension, calculation, learning capacity, language and judgment (WHO, 2009). The most common types of dementia are Alzheimer's disease (AD) and vascular dementia (VaD) (Alzheimer's Society, 2009). According to the ICD-10, AD is a neurodegenerative cerebral disease with unknown aetiology consisting of distinctive neuropathological and neurochemical qualities (WHO, 2009). It is primarily characterized by the accumulation of neurofibrillary tangles and amyloid plaques that damage neurons, altering brain function (Alzheimer's Society, 2009). The ICD-10 defines VaD as a progressive vascular disease resulting in small infarctions that have cumulative effects on brain function (WHO, 2009). The distinction between AD and VaD is not always clear. Most authorities consider the second most common aetiology of dementia to be a co-existence of these two disorders known as mixed dementia, as pure VaD is uncommon (Patterson & Clarfield, 2003).

Acetylcholinesterase inhibitors aim to improve the cognitive symptoms of AD and mixed dementia; however, the efficacy of these treatments remains limited. Recent systematic reviews on the use of acetylcholinesterase inhibitors have indicated that clinical trials tend to report small effects sizes; there is a lack of demonstrated clinical importance of such drugs, and evidence that they improve quality of life remains inconclusive (Qaseem et al., 2008; Rodda & Walker, 2009). The clinical value of pursuing non-pharmacological options as a first line approach is becoming increasingly recognized (Douglas et al., 2004). Occupational therapists play a critical role in the development and implementation of such strategies.

## Theoretical framework

The International Classification of Function, Disability and Health (ICF) is a comprehensive framework useful for assessing functional status, setting goals, developing interventions, monitoring change over time and measuring outcomes (WHO, 2001, 2009). The ICF is appropriate to be utilized by occupational therapists as

it shares strong conceptual connections to other commonly used occupational therapy models. This includes the Canadian Model of Occupational Performance, the Model of Human Occupation and the Occupational Performance Model (Australian) (Stamm et al., 2006). The comprehensive nature of the ICF is valuable in guiding rehabilitation interventions for individuals with dementia as it acknowledges relevant factors that influence everyday function for this population (Hooper, 2007).

## International Classification of Function, Disability and Health and dementia

### Body structures and functions

Cognitive symptoms associated with dementia are related to structural brain changes (ICF code s110; subcategories s1100–s1109) resulting from neuropathology. Structural changes include cerebral atrophy, ventricular enlargement and reduced brain weight (Patterson & Clarfield, 2003). These changes may have widespread effects upon functional status; however, the most prominent impact is on cognition and behaviour. Directly affected health domains include global (b110–b139) and specific mental functions (b140–b189).

Functional changes include language disturbances, difficulty carrying out motor activities, failure to recognize objects and disruptions in executive functioning (APA, 2000). The early stages of dementia include difficulty learning, decreased ability to form new memories and significantly impaired episodic memory (personally relevant events), whereas other types of memory such as semantic memory (factual knowledge) and procedural memory (performing routines or previously acquired skills) may remain relatively intact or mildly affected (Clare & Woods, 2003). Psychomotor or behavioural functional changes (b147) are common in the moderate stages of dementia. Such changes include wandering, agitation, resisting caregiver support, decreased emotional or behavioural control, disorientation, confusion and communication difficulties (Novak & Campbell, 2006).

### Activity and participation in life areas

This ICF component considers relevant task performance abilities, life experiences and capacity to engage

in life situations (WHO, 2001). Symptoms of dementia lead to significant disruptions in social and occupational participation (APA, 2000). The impact of cognitive changes often remains unique to each individual, and a wide range of domains may be affected (d110–d999). This includes, yet is not limited to, learning and applying knowledge, general tasks and demands, communication, mobility, self-care, domestic life, interpersonal relationships, leisure activities and community involvement.

As the degree of functional impairment ranges from mild to severe, activity and participation levels change over time. In the mild to moderate stages, functional changes influence activity engagement; however, individuals still have some ability to learn new information or skills given the appropriate environmental conditions, support and patience (Clare & Woods, 2003). The severe stage consists of profound physical symptoms such as incontinence, significantly limited mobility, extremely impaired communication and dependence on others for all activities of daily living (MacRae, 2005).

### Contextual factors

This component includes environmental and personal factors. Although all environmental domains outlined by the ICF are relevant to individuals with dementia, the one most commonly affected is support and relationships (e310–e399). Functional issues experienced by this population may directly affect relationships with informal (e310–e325) and professional care providers (e340, e355–e399). The degree of caregiver burden, the amount of difficulty or stress experienced daily by caregivers, may place additional strain on relationships between caregivers and care recipients (LoboPrabhu et al., 2006). Risk of caregiver distress increases when care recipients experience escalating behavioural symptoms, withdraw from social interactions or begin to demonstrate a pattern of reduced participation in activities previously considered meaningful (Egan et al., 2006; Novak & Campbell, 2006). Strained relationships may lead to further exacerbation of such symptoms, causing additional stress for both caregivers and recipients.

Personal factors consist of background details pertaining to the life of an individual that are not classified in the ICF because of the high degree of social and cultural variances that exist between individuals (WHO, 2001). Examples of these details include

demographic information, personal attributes, life experiences, personality or other health conditions. For individuals with mild to moderate dementia, memory and cognitive difficulties often result in personal factors such as anxiety, depression, decreased self-confidence or motivation and withdrawal from activities (Clare & Woods, 2003).

### Occupational therapy and dementia

The charter of principles outlined by Alzheimer's Disease International is consistent with the inherent values important to occupational therapy as it strongly encourages the implementation of a humanistic client-centred approach (ADI, 2005). Occupational therapists play an important role in addressing the unique needs of individuals with mild to moderate dementia. Through the strategic implementation of comprehensive functionally based assessments and consideration of ICF components, occupational therapists are able to skilfully develop a holistic understanding of the impact that cognitive changes have on the daily lives of these individuals. Common therapeutic goals include maintenance or remediation of cognitive function, compensation for deficits, reduction of behavioural symptoms and facilitation of supportive social and care giving relationships. Therapists continually modify intervention strategies according to the increasing severity of impairment.

As there is no cure for mild to moderate dementia, the effectiveness of treatment is not measured by complete functional recovery. Chapman et al. (2004) appropriately defined a positive response to treatment for this population as either increased level of functional performance, maintained ability over a period where decline is commonly expected or reduced rate of decline over time. Such positive functional outcomes have the potential to maintain identity, promote feelings of usefulness or enjoyment and minimize anxiety that may result from progressively decreasing capacity in the face of environmental demands (Egan et al., 2006). A randomized control trial (RCT) found community occupational therapy sessions that included cognitive and behavioural interventions for individuals with mild to moderate dementia to be associated with improved functioning in daily activities, reduced caregiver burden and a higher effects size in comparison with drug trials or other psychosocial interventions (Graff et al., 2006).

## **Cognitive stimulation and neurological evidence**

Research has demonstrated that maintaining a consistent pattern of frequent participation in cognitively stimulating activities is associated with reduced risk of developing dementia (Wilson et al., 2002). Regular participation in such activities may play a role in preserving the capacity of the brain to endure and compensate for neurodegeneration. Such a mechanism or “cognitive reserve” was described by Stern (2002) as the degree to which an individual is able to efficiently recruit alternative brain networks in order to optimize cognitive function following brain damage or pathology. Valenzuela and Sachdev (2005) found that higher cognitive reserves were associated with complex patterns of mental activity sustained throughout the life cycle and that increased mental activity in late life was associated with lower rates of dementia.

There is also considerable neurobiological evidence demonstrating the adaptability of the central nervous system, indicating structural re-organization (neuroplasticity), and certain degrees of functional recovery are possible following damage or pathology. Kleim and Jones (2008) described principles fundamental to experience-dependent neuroplasticity and their implications for rehabilitation following brain damage. These principles are applicable to individuals with dementia, as research on animals with a pathology comparable with AD has demonstrated that stimulating environments with increased opportunities for learning enhances cellular plasticity (Herring et al., 2009) reduces neuropathological hallmarks delaying memory deficits (Berardi et al., 2007) and counteracts neurovascular dysfunction (Herring et al., 2008).

## **Cognitive stimulation therapy for mild to moderate dementia**

As research suggests that rehabilitation of cognitive function is biologically possible, cognitive stimulation approaches may have therapeutic benefits for individuals with mild to moderate dementia by facilitating the delay of progressive cognitive impairments (Breuil et al., 1994; Spector et al., 2001). Such approaches must not be confused with cognitive training, which typically involves guided practice on standardized tasks such as recall of items on word lists; this strategy is somewhat controversial as it fails to consider cognition within a real-life context and as there is no significant

evidence that it is beneficial (Clare & Woods, 2003). Given the concerns regarding the potential for cognitive interventions to be insensitive experiences for individuals with dementia, efforts to develop person-centred cognitive stimulation approaches have emerged within recent years.

Although several different cognitive stimulation therapy (CST) programmes have been described in the literature, they all strive toward optimizing cognitive function within a socially oriented context through an integrative and inclusive approach. Central to this is the acknowledgement that global and specific cognitive functions are interrelated with other important functional aspects such as participation in daily activities, interpersonal relationships and overall quality of life. Designed to be enjoyable for participants, CST focuses on fostering individual strengths through structured functionally oriented activities that may be adapted according to individual or group needs. It typically includes themed sessions that incorporate therapeutic techniques such as reality orientation or reminiscence. Reality orientation is intended to facilitate memory through the use of aids that serve as factual reminders about the self or the environment (Douglas et al., 2004). Reminiscence therapy involves discussion of past activities, events or experiences often through the use of concrete prompts (Spector et al., 2000).

Cognitive stimulation therapy is relevant to occupational therapy as it is based upon fundamentals that are important to the profession including client centredness, activity analysis, grading activities and meaningful occupational participation (Salmon, 2006). Although CST may be administered by anyone with previous training and experience supporting the unique needs of individuals with mild to moderate dementia, occupational therapists are particularly well suited for this role because of their unique functionally oriented knowledge base and skill set. Cognitive stimulation approaches have the potential to assist in striving towards therapeutic goals such as minimizing psychomotor behaviours, enhancing social relationships or reducing caregiver distress. CST programme leaders must be able to effectively manage individual and group dynamics, remain flexible and person centred, provide motivation and encouragement, adapt session content and interaction style, as well as maintain a continued sensitivity to individual and group needs (Spector et al., 2008). Occupational

therapists are well equipped to meet these demands. It is therefore important to examine the effectiveness of CST programmes and their congruence with occupational therapy.

## Methods

### Search strategy

A resource librarian assisted with the selection of appropriate information sources as well as search terms and combinations. An expert in the field verified the appropriateness of the search strategy. Twenty-four computerized databases (Table A1.1) and 13 grey literature sources (Table A1.2) were searched in order to access a wide scope of sources related to occupational therapy, rehabilitation, medicine, allied health care, psychology and gerontology. Basic and advanced searches were implemented with each information source by using the search terms described in Table A2. Search combinations were developed by grouping terms in accordance with the main components of the search question: population, intervention and outcome. Wherever possible, ongoing searches with email alerts occurring at one-week intervals were set up to take place from August 2008 to May 2009. The following journals were hand searched: *Alzheimer's & Dementia*; *Dementia & Geriatric Cognitive Disorders*; *Aging Neuropsychology & Cognition*; *Dementia*; *Geriatrics & Gerontology International* and all relevant occupational therapy journals. Citations of all pertinent papers retrieved from the search were reviewed.

### Criteria selection

Papers published in the English language were selected from academic journals by comparing abstracts generated from the aforementioned search. As preliminary searches yielded no relevant results prior to 1990, the search was limited to papers published between the years 1990 and 2009. In order to gain a comprehensive understanding of the nature and quality of CST, a wide range of study designs were considered for inclusion. Table A3 outlines the specific inclusion criteria utilized to identify relevant studies for the present review.

### Analysis procedures

Relevant papers were identified by analysing abstracts yielded in the search. Papers that met the inclusion criteria (Table A3) were all quantitative and were

analysed using the McMaster Guidelines for the critical review of quantitative research studies developed by the McMaster University Occupational Therapy Evidence-based Practice Research Group (Law et al., 1998). This comprehensive tool designed by a team of occupational therapists focuses specifically on the critical review of evidence concerned with the effectiveness of occupational therapy interventions and development of programme evaluation tools (Law, 2007). The McMaster Guidelines (Law et al., 1998) were used to assist in the analysis of study design, methodology, results, conclusions and clinical significance.

From the McMaster Guideline results, a descriptive analysis table was developed to provide an overview of each study including methodology, results, implications and limitations (Table A4). Each component that could be quantified through yes or no qualifiers along with additional criteria relevant to the present study were recorded and scored (Table A5). A summary of paper quality based on the percentage of criteria reached on this scale is presented in Table A6. To establish the interrater agreement of this measure, a second independent rater was randomly assigned six of the papers identified. Blinded to the results obtained by the first rater, the second rater was provided the papers, the analysis tools and the general scoring guidelines. Interrater reliability for the quantified components of the McMaster Guidelines was calculated using the interrater correlation coefficient ( $ICC[1,1] = 0.57$  [95% CI 0.45 to 0.68]). This calculation was obtained using the statistical software package SPSS version 13.0 (Statistical package for the social sciences inc. Chicago Illinois USA, 2004).

To analyse the quality of RCTs, a modified version of the Jadad Quality Scale was used (Jadad et al., 1999). This scale has high interrater reliability (Oremus et al., 2001) and has been used in systematic reviews of drug trials for AD (Qaseem et al., 2008). A score of 3 or greater on the Jadad Quality Scale represents a good quality RCT (Jadad et al., 1999). The updated Oxford Centre for Evidence-based Medicine (OCEBM) Levels of Evidence Scale for therapeutic treatments described by Howick (2009) was also implemented. This scale rates the level of evidence of each individual study and provides an overall evidence grade ranging from A (high quality) to D (low quality) (Howick, 2009). To determine the congruence of CST with occupational therapy, common themes were extracted from study results and organized according to ICF domain

(Table A7). Prominent CST programme values described in each study were identified and matched to corresponding professional values central to the Canadian Association of Occupational Therapists as described in Townsend and Polatajko (2007).

## Results summary

### Search results

The search yielded a total of 507 abstracts, 23 of which were relevant to the present review. Of the 23 studies identified, 12 met the inclusion criteria (Table A3). Seven of the selected studies were RCTs, three were quasi-experimental cohort designs, one was a retrospective cohort design and one was a retrospective outcome study. The majority of eliminated papers described multimodal interventions that included a range of additional components such as training activities of daily living or participation in general recreational activities. Other primary reasons for paper exclusion included intervention approaches not comparable with CST or lack of focus on cognitive outcomes. One additional paper, a pilot study by Quayhagen and Quayhagen (1989), was found in the citation search and did not meet the date of publication criteria for the present review. This paper was therefore not reviewed extensively; however, it was taken into account for the review of subsequent research completed by Quayhagen et al. (1995) and Quayhagen and Quayhagen (2000, 2001).

### Descriptive results

Table A4 provides a detailed summary of the results obtained using the McMaster Guidelines. Among the studies analysed, there was moderate variability between study design, sample, intervention duration, outcome measures utilized and results. A common trend among the results was that CST interventions were found to have the potential to enhance cognitive function or at least slow the rate of decline. Although changes on cognitive outcome measures were relatively small, the results were considered to be clinically meaningful because of the progressive nature of dementia. Common limitations of the studies analysed in the present review included small unjustified sample sizes, lack of placebo controls, unequal amounts of attention across groups and limited descriptions of interventions utilized.

### Quantitative results

Table A5 reports data extracted from the McMaster Guidelines, modified Jadad Quality Scale and OCEBM Levels of Evidence Scale. Nine studies analysed met over 70% of the quantified McMaster Guidelines criteria with two studies reaching over 90%. As summarized in Table A6, the majority of studies reached the good to high quality range, and three studies were found to be of fair quality. All analysed studies scored highly in the reporting of appropriate results, conclusions and clinical implications. Methods to avoid cognitively stimulating co-interventions were not reported; however, this is difficult to completely control for in a clinical setting, and there is no reason to suspect this would be more likely to occur in one group over another. Procedures to avoid contamination of the control group were also not reported. This was not considered to be a significant issue as outcomes did not favour the control group. Results of studies that utilized the Mini-Mental State Examination (Folstein et al., 1975) as a sole outcome measure must be interpreted with caution as outcomes may have been within the standard error of the assessment utilized.

Overall, the seven RCTs analysed approached good quality on this scale with a total of four studies scoring 3, for an average score of 2.43. Studies primarily lost points for an inadequate description of randomization procedures and lack of double blinding. On the OCEBM Levels of Evidence Scale, one study scored 1a, nine studies achieved a score of 2b, one scored 2c and one scored 4. As a result, an overall grade of B was awarded representing good quality evidence.

### Congruence with occupational therapy

Table A7 illustrates research findings from each CST programme according to their respective ICF domain and provides an overview of the prominent Canadian Association of Occupational Therapists values central to each programme. The CST interventions described in each study corresponded with a wide range of values important to occupational therapy. Prominent themes included respectfulness of individuality, recognition of capacity for self-determination, encouragement of participation in meaningful activities and optimization of overall well-being. Furthermore, CST programmes consisted of therapeutic goals and outcomes relevant to occupational therapy. Half of the analysed studies

reported positive functional outcomes including enhanced emotional regulation and interpersonal relationships. The studies that examined environmental factors such as caregiver outcomes suggested that CST programmes have the potential to reduce symptoms of caregiver distress.

## Discussion

### Principal findings

There is a growing foundation of research supporting the use of CST interventions for optimizing cognitive function in individuals with mild to moderate dementia. Clinical trials exploring the effectiveness of CST have demonstrated a trend towards improvement in cognition or delayed decline relative to those who are not receiving the intervention. The results of the present review have demonstrated this evidence to be of respectable quality. CST is appropriate for use by occupational therapists as it is a person-centred approach, consistent with values central to the profession, which aims to preserve cognitive function in order to enable optimal levels of engagement in meaningful functional domains.

### Clinical significance

Cognitive changes following CST are relatively modest; however, the observed trend towards improvement or maintenance of cognitive function must not be ignored. Results of studies that utilized the Mini-Mental State Examination (Folstein et al., 1975) as a sole outcome measure must be interpreted with caution, however, as outcomes may have been within the standard error of the assessment utilized. The majority of studies analysed in the present review utilized more than one cognitive outcome measure. Overall, the results of research on CST interventions are clinically meaningful and functionally relevant.

A large multicenter RCT conducted by Spector et al. (2003) identified that CST might have outcomes comparable with pharmacological treatments. These findings were based on the results of numbers needed to treat analysis, which involves calculating the number of individuals needed to be treated to achieve one favourable outcome. The results of this study were noteworthy as the duration of the CST trial occurred over 7 weeks, a relatively short time frame compared with drug trials lasting up to 30 weeks

(Spector et al. 2003). The authors indicated that these results should be interpreted cautiously because of the inherent differences between pharmacological and non-pharmacological approaches. Woods et al. (2006) found that CST participation was associated with enhanced quality of life in functionally relevant areas including improved relationships with significant others, energy levels and ability to perform chores. Chapman et al. (2004) reported that CST improved components of communication while reducing symptoms of dementia such as apathy and irritability. The authors of this study also found reduced caregiver distress following the intervention.

### Implications for occupational therapists

Cognitive stimulation therapy provides a useful foundation for occupational therapists to build multidimensional programmes for individuals with mild to moderate dementia. In the UK, the National Institute for Clinical Excellence recommends that opportunities to participate in cognitively stimulating programmes should be provided to individuals with mild to moderate dementia of all types, including those receiving drug treatments for cognitive symptoms (NICE, 2006). Engaging individuals in such programmes has the potential to play an integral role in striving towards the achievement of therapeutic goals for this population. The integrative and inclusive nature of CST also provides therapists with relevant information that may complement functionally based assessments or development of person-centred care plans.

Cognitive stimulation therapy is appropriate for implementation in both community-based and institutional settings. Therapy assistants may also be trained to lead CST programmes. It is important to note that programme effectiveness may depend upon therapeutic approach and administrator experience level. Although some CST interventions described in the literature may be difficult to reproduce clinically because of limited intervention descriptions, there are positive components of each that may be drawn upon. This includes creating a climate of acceptance and appreciation (Koh et al., 1994), adopting a reactivation approach (Bach et al., 1995), providing caregivers with goal-oriented home programmes (Quayhagen et al., 1995; Quayhagen & Quayhagen, 2000, 2001) and implementing ongoing sessions to maintain function over time (Orrell et al., 2005). When adapting and

implementing CST programmes, the principles of neuroplasticity described by Kleim and Jones (2008) provide a useful frame of reference for therapists as research by Quayhagen and Quayhagen (2001) indicated that cognitive changes observed appear to be related to the specific programme focus.

One of the most rigorously researched CST programmes was developed in the UK by Spector et al. (2001, 2003). It has been extensively described in a programme manual for group leaders (Spector et al., 2006). This structured programme includes 14 themed sessions implemented over 7 weeks. Session themes include physical games, sounds, childhood memories, food, current affairs, faces and scenes, word association, creativity, object categorization, orientation, money management, numbers and word games (Spector et al., 2006). This CST programme is clinically reproducible and is supported by relatively high-quality evidence. It has been found to be cost effective (Knapp et al., 2006), and a North American version is also available (Spector et al., 2005).

### **Neurobiological mechanisms**

The specific neurobiological mechanisms responsible for the positive outcomes following CST are currently not well understood. One plausible explanation might be that cognitive stimulation mediates neurodegeneration and facilitates neuroplasticity. A recent study on individuals with mild to moderate dementia found that reminiscence therapy improves blood flow in the brain, particularly the frontal lobe (Tanaka et al., 2007). A similar effect may be observed following person-centred, integrative cognitive stimulation approaches.

### **Quality of evidence**

Despite the previously reported methodological limitations to the analysed studies, overall, the evidence was found to be of respectable quality. This remained consistent on three different measures assessing quality. The results obtained using the McMaster Guidelines were favourable, particularly in the appropriate reporting of results and conclusions. On average, RCTs approached an adequate score on the Jadad Quality Scale. Further support was achieved on the OCEBM Levels of Evidence Scale. As the overall evidence grade awarded was B, with only one study scoring below level 2c, it is clear that existing evidence

supporting the use of CST interventions is of respectable quality.

### **Literature review strengths and limitations**

When interpreting the findings of the present review, it is important to consider the following strengths and limitations. The search strategy was extensive, covering a wide range of databases and grey literature sources. It was approved by a resource librarian and an expert in the field. A broad range of research designs was considered appropriate to achieve a comprehensive understanding of the scope and quality of existing evidence corresponding to the proposed research question. The inclusion of heterogeneous study designs presented challenges to data analysis; however, multiple analysis tools were utilized in order to minimize bias. The quantitative and qualitative properties of selected measures were useful in the extrapolation of clinically relevant information from each paper.

The exclusion of papers prior to the year 1990 may have limited the search results, omitting relevant studies such as the work by Quayhagen and Quayhagen, (1989) that was obtained after the database searches were completed. The psychometric properties of the McMaster Guidelines have not yet been established. As there was no standardized procedure for obtaining and scoring quantitative data from the McMaster Guidelines, general scoring guidelines were developed for the purposes of the present review. Because of time constraints, only six of the 12 studies were reviewed by a second rater. This small sample size might account for the moderate level of agreement observed between raters. The Jadad Quality Scale is a validated measure; however, it does not award points for single blinding procedures. This is an important consideration as double blinding is not always possible in clinical settings. An additional limitation is that change on cognitive measures may be considered a surrogate outcome with limited clinical importance. This was a primary reason for the inclusion of a wide range of study designs as it permitted the extraction of information illustrating the impact of cognitive changes in multiple ICF domains.

### **Future research**

The results of the present review have highlighted future directions for research on CST interventions

including the need to examine the outcomes of CST within the context of everyday functioning and components central to the ICF. This includes initiatives focusing on determining the effectiveness of CST in reducing caregiver burden or identifying changes in activity participation following the intervention. There is a need for future studies to establish a clearer distinction between the efficacy of CST in comparison with standard recreational activities or other cognitive approaches. Furthermore, there is currently a lack of awareness regarding the optimum duration, intensity and frequency of CST required in order to achieve maximal functional benefits.

The results of the present review warrant more high-quality RCTs that include sample sizes comparable with those used in drug trials and a placebo control group where participants receive the same amount of attention as the treatment group. There is an even greater need for high-quality qualitative research examining the ethnographic or external validity of CST as the search strategy for the present review yielded no qualitative studies. Such findings would provide a more comprehensive understanding of the impact that CST programmes have on the lives of the clients and their caregivers within the context of everyday functioning.

## Conclusion

Cognitive stimulation therapy is a supportive, functionally oriented strategy aimed at enabling individuals with mild to moderate dementia to remain meaningfully engaged in their lives and surroundings. Occupational therapists are well suited to implement CST as it is congruent with values and goals important to the profession. Current research examining the effectiveness of CST is encouraging and has provided quality evidence supporting the use of such interventions. As a result, CST may provide a useful foundation with which to build multidimensional programmes and care plans for individuals with mild to moderate dementia. Occupational therapists have the potential to make valuable contributions to future CST research and programme development.

## Key messages

- There is a growing need for supportive programmes for individuals with mild to moderate dementia and their families.

- The use of CST is supported by quality evidence that has demonstrated a clinically meaningful degree of effectiveness in maintaining cognitive function.
- CST is appropriate to be implemented by occupational therapists as the approach encompasses values and goals central to the profession.

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## Appendix A – Tables

**Table A1.1. Databases**

1. CINAHL	13. PsycBITE
2. AARP AgeLine	14. Academic OneFile
3. MEDLINE	15. Trip
4. PsycINFO	16. OTDBASE
5. ScienceDirect	17. Web of Science
6. PubMed	18. AMED
7. Google Scholar	19. CIRRIE Database of International Rehabilitation Research
8. REHABDATA	20. Academic Search Complete
9. The Cochrane Library	21. Health Source: Nursing Academic Edition
10. SciVerse Scopus	22. Abstracts in Social Gerontology
11. OTseeker	23. Conference Papers Index
12. EMBASE	24. ProQuest Dissertations and Theses

**Table A1.2. Grey literature sources**

1. Canadian Institute for Health Information
2. Canadian Health Research Foundation
3. Canadian Evaluations Society
4. Health Canada
5. Theses Canada
6. Intute: Health and Life Science
7. Intute: Nursing, Midwifery and Allied Health
8. OT direct
9. CAOT (Canadian Association of Occupational Therapists)
10. BJOT (British Journal of Occupational Therapy)
11. WFOT (World Federation of Occupational Therapists)
12. Alzheimer's Society Canada
13. Alzheimer's Society International

**Table A2. Search terms**

1. Older adult <sup>a</sup>
2. Elderly
3. Senior <sup>a</sup>
4. Dementia <sup>a</sup>
5. Alzheimer's
6. Cognitive function
7. Cognitive process <sup>a</sup>
8. Cognition
9. Cognitive stimulation
10. Cognitive therapy <sup>a</sup>
11. Cognitive stimulation therapy <sup>a</sup>
12. CST
13. Rehabilitation
14. Therapy <sup>a</sup>
15. Occupational therapy
16. Psychology
17. Validity
18. Reliability

<sup>a</sup>Indicates truncation.

**Table A3. Criteria selection**

Participants
<ul style="list-style-type: none"> <li>• Medical diagnosis of dementia (AD, VaD or mixed type) according to standardized diagnostic</li> <li>• Mild to moderate stages of dementia</li> <li>• Average age of over 65 years</li> <li>• Community or institutional residence</li> <li>• May or may not have been receiving pharmacological treatments cognitive symptoms</li> </ul>
Intervention
<ul style="list-style-type: none"> <li>• CST programmes or comparable approaches with respect to theoretical basis, guiding principles, methodology, selected tasks, procedures and functional goals</li> <li>• Integrative approach that recognizes the interrelated nature of cognitive functions within a social context (focuses on more than one specific aspect of cognition)</li> <li>• Structured programme for groups or individuals</li> <li>• May or may not have included the involvement of family caregivers</li> <li>• May have occurred at various sites including community-based programmes, adult day support and outpatient or inpatient facilities</li> <li>• Excluded studies examining:               <ul style="list-style-type: none"> <li>– general leisure activities</li> <li>– multimodal approaches including additional interventions to CST</li> <li>– cognitive training interventions (including spaced-retrieval, computer-based interventions or other interventions centred upon practice/drill)</li> </ul> </li> </ul>
Outcomes
<ul style="list-style-type: none"> <li>• Improved or maintained cognitive function (in comparison with baseline) over a period where decline is commonly expected</li> <li>• Secondary outcomes associated with cognitive changes related to other relevant components/domains of the ICF</li> </ul>

AD, Alzheimer's disease; CST, cognitive stimulation therapy; ICF, International Classification of Function, Disability and Health; VaD, vascular dementia.

**Table A4. Descriptive summary of results**

Study	Purpose	Design and sample (n)	Intervention	Outcome measures	Results	Conclusion(s) and clinical implications	Limitations and potential biases
Bach et al. (1995)	To determine the effectiveness of functional rehabilitation plus a reactivating occupational therapy programme compared with functional rehabilitation alone for individuals with mild to moderate dementia	Double blind RCT; unclear group allocation and concealment procedures; baseline, mid-intervention and post-intervention assessments n = 44 long-term therapy centre inpatients Dropouts = not reported Treatment = 22 Controls = 22	Functional rehabilitation consisted of standard occupational, physical and speech therapy. Reactivating occupational therapy consisted of themed sessions, which included activities that stimulated recall, recognition, sensorimotor function and self-management. Two sessions (60 minutes) occurred per week over 24 weeks	Clinical Assessment Geriatric Scale; Hamilton Depression Rating Scale; Depression Status Inventory; Benton Test; Grunberger Verbal Memory Test; Nuremberg Aged Persons Inventory Tests (number association, number symbol and latent learning)	No differences between groups at baseline. Following 24 weeks of treatment, reactivating group had significant improvement in cognitive performance for verbal memory and latent learning ( $p < 0.001$ ) compared with controls. Slight visuomotor improvement. Significant differences were found in global and depressive symptoms ( $p < 0.001$ )	Improvement stagnated at 12 weeks for the control group. The reactivating occupational therapy programme was significantly more effective as this group continued to improve in most outcome areas particularly cognitive and psychosocial functioning. Improvements were most prominent following 24 weeks of treatment. Longer stimulation may improve the ability to mobilize residual cognitive resources	Large age range may have resulted in group differences despite similar mean ages. Psychometric properties of assessments were not reported. Patients were recruited shortly after admission (which may have required an adjustment period). The treatment group received more attention than the control group. The intervention description was fairly general and may be difficult to reproduce. It lacked process details including guiding principles, specific activity protocol and time allocation
Breuil et al. (1994)	To report preliminary results of cognitive stimulation aimed at improving cognition in individuals with dementia	Single blind RCT; unclear group allocation procedures; baseline and post-intervention assessment n = 61 outpatients Dropouts = 5 Treatment = 29 Controls = 27	Stimulating tasks aimed at encouraging mental imagery to improve encoding, consolidating and retrieving of information Ten sessions occurred (60 minutes) for over 5 weeks	CERAD neuropsychological assessment battery; ADL Scale; Echelle comportementale adaptive	Both groups were comparable at baseline. Stimulated group had significant improvements in MMSE ( $p < 0.01$ ) and global scores. There was no change in verbal fluency or ADL	The programme improved MMSE scores and memory performance. It was unlikely that changes were due to practice effects. Dramatic improvements should not be expected given the nature of the condition and short-term intervention	Small sample size and the age range of the control group were greater than the treatment group. The treatment group received more attention than the control group. Five components of the outcome measures were eliminated (because of ceiling and floor effects), which limited the assessment scope. Intervention lacked process details, making it difficult to reproduce

Table A4. Continued

Study	Purpose	Design and sample (n)	Intervention	Outcome measures	Results	Conclusion(s) and clinical implications	Limitations and potential biases
Chapman et al. (2004)	To evaluate the combined effect of a cognitive-communication programme plus acetylcholinesterase inhibitor (donepezil) compared with drug treatment alone	Single blind RCT; appropriate allocation and concealment procedures; baseline, post-intervention and follow-up assessments n = 54 community-dwelling older adults Dropouts = 13 Treatment = 28 Controls = 26	Conversational interaction focus to improve relevant verbal content through discussion topics (current events, hobbies, etc.) and life story reminiscence. Homework activities were also provided. Groups met once each week (90 minutes) for 8 weeks	MMSE; ADAS-Cog; Texas Functional Living Scale; NPI; clinical interview-based on impression of change; verbal composite discourse score; QoL	Stimulated group had a slower rate of decline in all outcome areas; not all areas were significant. MMSE scores in stimulated group remained stable, and controls declined significantly ( $p = 0.0005$ , 95% CI -4.18 to -0.10). Caregiver stress was reduced over time in the treatment group ( $p = 0.0213$ , 95% CI 3.59 to 7.56)	There was a slowing of decline rather than improved performance. Short-term intervention positively impacted areas of communication, functional ability, emotional well-being (including reduced apathy and irritability) and global functioning. Benefits of stimulation group generalized to areas not directly targeted. Increased dose of stimulation, longer duration of intervention, individual treatment or active caregiver involvement may have further benefits	Participant volunteers may have been susceptible to placebo effects because of higher hopes of recovery. Treatment group received more attention than control. Average decrease in MMSE scores (-2.14) in control group may be within the standard error of assessment. No certain results could be attributed solely to intervention (treatment group scored better on the ADAS-Cog at baseline). Relatively high rate of attrition and reasons for dropouts were not addressed in detail
Koh et al. (1994)	To determine the effectiveness of a 3R mental stimulation programme consisting of reality orientation, reminiscence and remediation techniques	Quasi-experimental cohort design; pre-intervention and post-intervention assessments n = 30 community-dwelling older adults Dropouts = not reported Treatment = 15 Controls = 15	Themed sessions designed to stimulate recollection, orientation and reasoning through structured discussions. Multisensory stimulation techniques were also utilized. Sessions occurred once a week (60 minutes) for 8 weeks	Modified Mental Status Questionnaire (consisted of often questions)	The treatment group had significantly improved scores on the Modified Mental Status Questionnaire ( $p < 0.001$ , 95% CI); the control group scores significantly decreased ( $p < 0.05$ , 95% CI)	The findings of this research suggest that the 3R programme improved mental status (at least in the short term) and may be beneficial for community-dwelling older adults with dementia. The programme is inexpensive, easy to administer and does not require extensive training	Group allocation was not random, and concealment was not reported. Only one assessment consisting primarily of orientation questions (other cognitive areas were not addressed) was used, and psychometric properties were not reported. This indicated that the programme may have reinforced items on the MSS. Treatment and

control groups did not receive the same amount of attention. Continued follow-up and long-term validation was not possible

Matsuda (2007) To examine the combined effect of cognitive stimulation therapy and donepezil on the progression of cognitive decline in Alzheimer's disease compared with donepezil alone

Quasi-experimental cohort design; allocation base on volunteers; pre-intervention and post-intervention assessments  
*n* = 30 outpatients  
 Dropouts = 0  
 Treatment = 17  
 Controls = 13

Focused on activities such as story learning, word fluency and communication; errorless learning approach, discussion, reminiscence, psychoeducation and psychological support  
 The CST group received about 20 sessions (60 minutes) over 1 year (first eight were once a week; the rest occurred every 2 weeks)

Baseline cognitive profile obtained using the COGNISTAT  
 Cognition was assessed using the MMSE (baseline and post-intervention)

On average, control group declined by two MMSE points, whereas CST group did not decline significantly. Change in MMSE scores from baseline was significantly different compared with controls ( $p < 0.05$ ). Control group effect size was relatively large and negative (ES = -0.81); treatment group effect size was close to zero (ES = 0.08)

CST may have additive positive effects in maintaining cognitive function when combined with donepezil. A change of 3 to 4 MMSE points is needed for clinical relevance. The average decline of 2 points in the control group may be within the measurement error; 23.1% of controls (three patients) declined by four points compared with no decline in the treatment group. A large multicentre trial is needed to confirm the value of CST

Participants volunteered for treatment group (may have been more motivated or cared more about health than controls). The study is vulnerable to bias because of small sample size, non-randomized groups and greater amount of attention received by the treatment group. This lacked masked/independent evaluation (only one evaluator who was aware of group allocation). Only one outcome measure (MMSE) limits the interpretation of results. Baseline COGNISTAT scores obtained; no follow-up with this measure

Spector et al. (2001) Pilot study describing the development and implementation of a user-friendly cognitive stimulation therapy programme for individuals with mild to moderate dementia

Systematic literature review and programme development  
 description; pilot study (RCT); pre-intervention and post-intervention assessments  
*n* = 35 resident homes and day care centres  
 Dropouts = 8  
 Treatment = 17  
 Control = 10

The programme included elements of reality orientation, reminiscence, errorless learning and multisensory stimulation. Four phases of themed sessions included the senses, remembering the past, people and objects and

MMSE; ADAS-Cog; Holden Communication Scale; CDR; Cornell Scale for Depression in Dementia; Behaviour Rating Scale; General Health Questionnaire; Relative Stress Scale

Positive trends in cognition (ADAS-Cog and MMSE) Increased severity of dementia (CDR) for controls; significant decrease in depression in treatment group and increase in depression in control group ( $p < 0.05$ ); caregiver stress also decreased ( $p < 0.05$ ).

This CST programme is respectful and sensitive to individual needs and prevents provoking frustration or distress. Sessions were presented in a game-like covert manner to minimize focus on individual deficits. Explicit (learning names of others or recall of

Random allocation did not produce well-matched samples (treatment group had lower baseline cognition and higher depression/anxiety). Small sample and group allocation concealment was not reported. Some group members were taken away from friends during session, which may have affected performance. Treatment

**Table A4.** *Continued*

Study	Purpose	Design and sample (n)	Intervention	Outcome measures	Results	Conclusion(s) and clinical implications	Limitations and potential biases
Spector et al. (2003)	To test the hypothesis that CST for older adults with dementia benefits cognition and quality of life	Single blind multicenter RCT; appropriate allocation and concealment procedures; pre-intervention and post-intervention assessments n = 201 from 23 residential homes and day care centres Dropout = 34 Treatment = 97 Control = 70	Adapted from Spector et al. (2001), CST intervention sessions focused upon improving cognition through reality orientation and reminiscence activities. It focused on eliciting implicit rather than explicit memories and incorporated an errorless learning approach. Sessions (45 minutes) occurred twice a week for 7 weeks	MMSE; ADAS-Cog; QoL-AD; Holden Communication Scale; CAPE-BRS; Clinical Dementia Rating Scale; Cornell Scale for Depression in Dementia; Rating Anxiety Scale in Dementia	CST group had significantly improved scores on MMSE ( $p = 0.044$ , 95% CI 0.57 to 2.27, effects size = 0.37), ADAS-Cog ( $p = 0.014$ , 95% CI 0.64 to 4.09, effects size = 0.37) and QoL ( $p = 0.028$ ; 95% CI 0.09 to 3.18; effect size = 0.39). Numbers needed to treat analysis (NNT = 6) were comparable with commonly used drugs	The CST programme enhanced cognitive function QoL of participants. Changes not related to explicit rehearsal as the intervention did not reinforce this. The effects were comparable with drugs commonly used to treat the disorder. The programme appeared to be popular with participants and may be adapted to meet individual needs. CST is user friendly, easy to incorporate into a care plan and may be implemented in a variety of settings	Strict participant inclusion criteria required for assessment purposes may affect external validity. Control group did not receive the same amount of attention and co-intervention difficult to control for. Outcome measures based upon staff ratings may have been biased. Small facilities were excluded from the study. Pre-existing contextual differences existed between centres (some offered regular activity programmes, whereas others did not). Assessment results varied between centres. To maintain the benefits of the programme, likely that CST would need to be continued on a regular basis
Orrell et al. (2005)	To determine the effectiveness of a weekly cognitive stimulation maintenance	Pilot study (quasi-experimental cohort design) follow-up from	MCST programme (16 weekly sessions) provided to participants	The measures used included the MMSE, QoL, AD Scale,	Change over time in MMSE scores were significantly different between	Weekly MCST beneficial for maintaining cognitive benefits for about 6 months following original	Homes recruited through voluntary participation rather than randomizationSmall sample size (lacks power to

<p>programme (MCST) following the CST programme described by Spector et al. (2003)</p>	<p>multicentre single blind RCT by Spector et al. (2003); pre-intervention and post-intervention assessments Three groups: <math>n = 35</math> participants from the RCT Dropout = 0 CST + MCST = 8 CST alone = 12 Control = 15</p>	<p>Holden Communication Scale and CAPE-BRS</p>	<p>Sessions designed to provide continuity with the original CST (maintained similar structure) The programme incorporated components of reminiscence therapy, multisensory stimulation and reality orientation</p>	<p>groups (<math>p = 0.012</math>). The MCST group improved following both CST and MCST. The control group performed worse at follow-up compared with baseline. There were no significant differences in the other outcome areas; there were positive trends in communication and behaviour</p>	<p>intervention (larger scale studies required to confirm results). Increased treatment frequency may be needed to positively impact QoL. Results indicated benefits gained in cognitive function and QoL. lost 16 weeks post-intervention. Small changes in cognition may significantly affect areas of functional dependence; however, behavioural assessments may not be sensitive enough to detect such changes</p>	<p>detect potential group differences; possibility of a type 2 statistical error). Sample may not adequately represent initial CST sample (3% were male compared with 21% in the first sample). Two people included as part of the CST only group as they were unwell (may have been biased if physical deterioration was related to cognitive decline). Staff completing the behaviour and communication rating scales were not blind to group allocation</p>
<p>Woods et al. (2006) To examine whether changes in QoL and cognition occurred independently, for different reasons, or whether effect of treatment was mediated by changes in cognition; secondary, to determine specific domains of QoL, which change in response to CST groups</p>	<p>Retrospective outcome study follow-up from the multicentre single blind RCT by Spector et al. (2003); pre-intervention and post-intervention assessments <math>n = 201</math> from 23 residential homes and day care centres Dropout = 34 Treatment = 97 Control = 70</p>	<p>MMSE; AD Assessment Scale; Cognition; QoL-AD; Holden Communication Scale; CAPE-BRS; Clinical Dementia Rating Scale; Cornell Scale for Depression in Dementia; Rating Anxiety Scale in Dementia</p>	<p>As described by Spector et al. (2001, 2003), CST intervention sessions focused upon improving cognition through reality orientation and reminiscence activities. Focused on eliciting implicit rather than explicit memories and incorporated errorless learning approach. Sessions (45 minutes) occurred twice a week for 7 weeks</p>	<p>CST had significant positive effects upon QoL-AD scores (<math>p &lt; 0.05</math>). QoL in treatment group was correlated with improved cognition on MMSE and ADAS-Cog (0.26 and <math>-0.33</math>, respectively; <math>p &lt; 0.01</math>) and for sample as a whole (0.25 and <math>-0.23</math>; <math>p &lt; 0.01</math>). Higher QoL was associated with higher functional levels, increased communication,</p>	<p>Improvements in QoL scores mediated by improved cognition. Perceptions of improved memory might lead to positive changes in well-being. There appeared to be pattern linking cognition with QoL in three general areas: memory, social functioning and activity level. CST may be an effective addition to a more comprehensive and holistic care strategy</p>	<p>Participants were not blind to treatment group. Men were outnumbered and may have found group as less interesting. Attention bias was not controlled for; factors such as group activity may have contributed to cognitive change. As a result of strict inclusion criteria necessary for assessment procedures, the sample may not be representative of QoL typically experienced by individuals with mild to moderate dementia; results may lack external validity. Perceptions of caregivers and staff considered necessary</p>

Table A4. Continued

Study	Purpose	Design and sample (n)	Intervention	Outcome measures	Results	Conclusion(s) and clinical implications	Limitations and potential biases
Quayhagen et al. (1995)	To determine cognitive and behavioural impact of a home-based intervention programme of active cognitive stimulation implemented by a family caregiver	RCT with placebo group passively observed; unclear randomization and concealment procedures; pre-intervention, post-intervention and follow-up assessments n = 95 community-dwelling care recipients with informal caregivers Dropout = 17 Treatment = 25 Placebo = 28 Control = 25	Comprehensive programme based on Quayhagen and Quayhagen (1989) Caregivers (spouses) trained intervention techniques, provided a programme workbook and weekly log. Programme graded based on individual ability and each week had a specific cognitive focus. Consisted of daily (60 minutes, 5 days per week for 12 weeks) active cognitive stimulation sessions including memory, problem solving, conversational activities	Mattis Dementia Rating Scale; Wechsler Memory Scale – Revised; Fluency; FAS and category tests; Geriatric Coping Scale, Behavioural Problems Checklist (caregiver rating)	Treatment group had statistically significant improvements in overall cognitive functioning ( $p = 0.004$ ), word fluency ( $p = 0.005$ ) and recall of non-verbal material ( $p = 0.006$ ). Control group declined post-treatment and at 9-month follow-up. Placebo group maintained baseline general memory ability and declined in general cognitive function. Placebo and treatment groups had fewer behavioural issues compared with controls	Cognitive improvements observed rather than maintenance. Analysis of weekly log recordings suggested may be a transfer of training to daily life setting; considered plausible as intervention had ecologically grounded components. At 9-month follow-up, treatment group was at or near baseline. Indicates that the programme may need to be sustained for maintained benefits	Although attempts were made to maintain distinctions between active and passive protocols, groups may have been too similar. The placebo and control groups did not receive as much attention as the treatment group. The intervention description was quite detailed; however, process details were omitted, making this difficult to reproduce clinically. Intensity of the programme may not be realistic (time consuming); caregivers were at increased risk of physical, psychological or emotional burnout. There was a proportionally high number of dropouts compared with the size of each group
Quayhagen and Quayhagen (2000)	To evaluate efficacy of four interventions (non-pharmacological) on outcomes for spouses coping with dementia	Single blind RCT; unclear randomization procedures; pre-intervention and post intervention	Cognitive stimulation programme was an integrated version of previous work by Quayhagen and Quayhagen, (1989) and Quayhagen et al.	Subscales of Wechsler Memory Scale – Revised; Dementia Rating Scale; FAS; Geriatric Coping Schedule; Memory and	Cognitive stimulation group had greatest improvements in delayed memory ( $p = 0.029$ ), problem solving ( $p = 0.009$ ) and verbal fluency ( $p = 0.018$ ).	The cognitive stimulation intervention may have produced more favourable cognitive changes than day care group as caregiver because of a	Short-term study; not able to determine long-term effects of interventions Interventions were not equal in intensity or frequency and may have contained similar

<p>assessments n = 103</p>	<p>community-dwelling care recipients with informal caregivers</p>	<p>Dropouts = not reported Cognitive stimulation = 21 Counselling = 29 Seminar = 22 Day care = 16 Control = 15</p>	<p>(1995), which focused on individual dyads (not limited to spouses). Other cognitive intervention was an early-stage day care group. Two other interventions had a more affective focus including counselling sessions and community-based group support seminar. Interventions occurred over an eight-week period and varied in duration/frequency</p>	<p>Behavior Problems Checklist (Part A); caregiver outcomes such as relationships, emotional well-being, physical status and coping. A programme evaluation questionnaire was also completed</p>	<p>There was an enhanced communication and interaction between the care giving dyads. The day care programme enhanced emotional involvement and decreased caregiver hostility symptoms</p>	<p>more intensive focus on enhancing cognitive skills. Enhanced communication and interaction with caregivers in the cognitive stimulation group may be related to focus on positive reinforcement and ignoring negative responses. All four interventions were found to have positive benefit for participants in different outcome areas</p>	<p>components. Sample was heterogeneous; generalizability of findings was limited as participants had higher levels of education compared with norms. Many participants did not return programme evaluations (it is possible that these individuals may have been less positive towards the interventions)</p>
<p>Retrospective cohort study comparing the treatment results of samples derived from two RCTs; pre-intervention and post-intervention assessments</p>	<p>Study A: n = 56 Treatment = 20 Placebo = 19 Control = 17 Study B: n = 30 Treatment = 18 Control = 12</p>	<p>Study A: As described in the study by Quayhagen et al. (1995) Study B: As described in the study by Quayhagen and Quayhagen (2000)</p>	<p>Subscales of Wechsler Memory Scale – Revised; Dementia Rating Scale; FAS; Geriatric Coping Schedule; Memory and Behavior Problems Checklist (Part A)</p>	<p>Study A: Improvements in immediate memory (p = 0.003) and verbal fluency (p = 0.001) compared with control behaviours Study B: Improvements in problem solving (p = 0.045) and verbal fluency (p = 0.031); no difference in memory compared with baseline Comparison: There were no differences between long and short interventions (increased immediate memory, verbal fluency and problem</p>	<p>Home-based cognitive stimulation intervention appeared to improve components of cognition despite being shortened from 12 to 8 weeks and having a modified focus. In comparing the two programmes, changes were not substantial enough to make a difference, except when comparing the interventions with their respective control groups. Longer intervention had more positive effect on improving memory; may be related to seven-week</p>	<p>Methodological differences existed between two studies, which limited the analysis of data. Only one study was placebo controlled and had long-term follow-up assessment. Participant inclusion criteria in both studies were different, and original sample sizes were reduced as a result. In the first study, there were substantially more men than women. Treatment groups received more attention compared with controls. As previously indicated, these interventions lacked</p>	

**Table A4.** *Continued*

Study	Purpose	Design and sample ( <i>n</i> )	Intervention	Outcome measures	Results	Conclusion(s) and clinical implications	Limitations and potential biases
					solving regardless of the programme length). Both treatment groups improved over time and controls declined	focus on specific aspects of memory. Shorter intervention had increased problem solving, which may be attributed to the inclusion of weekly practical problem-solving techniques	process details, making them difficult to reproduce

ADAS-Cog, Alzheimer's Disease Assessment Scale – Cognition; ADL, activities of daily living; CAPE-BRS, Clifton Assessment Procedures for the Elderly Behaviour Rating Scale; CDR, clinical dementia rating; CERAD, Consortium to Establish a Registry for Alzheimer's Disease; COGNISTAT, Cognitive Status Examination; MCST, maintenance cognitive stimulation therapy; MMSE, Mini-Mental State Examination; NPI, Neuropsychiatric Inventory; QoL, qualities of life; QoL-AD, Quality of Life – Alzheimer's Disease; RCT, randomized control trial.

**Table A5. Quantitative research summary**

Study	Bach et al. (1995)	Breuil et al. (1994)	Chapman et al. (2004)	Koh et al. (1994)	Matsuda (2007)	Orrell et al. (2005)	Spector et al. (2001)	Spector et al. (2003)	Woods et al. (2006)	Quayhagen et al. (1995)	Quayhagen and Quayhagen (2000)	Quayhagen and Quayhagen (2001)	Average
Clearly stated purpose	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Relevant literature provided justification	0	1	1	1	1	1	1	1	1	1	1	1	0.92
Theoretical rationale provided	1	1	1	0	1	1	1	1	1	1	1	1	0.92
Appropriate study design	1	1	1	0	0	1	1	1	1	1	1	0	0.75
<b>Sample</b>													
Detailed sample description	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Comparable groups (baseline)	1	1	0	1	1	1	0	1	1	1	1	1	0.83
Justified sample size	0	0	0	0	0	0	0	1	1	0	0	0	0.17
Informed consent/ethical procedures reported	0	1	1	1	1	1	1	1	1	1	1	1	0.92
<b>Outcomes</b>													
Reliable outcome measures	0	0	0	0	1	1	1	1	1	1	1	1	0.67
Valid outcome measures	0	1	0	0	1	1	1	1	1	1	1	1	0.75
Comprehensive cognitive outcome measures	1	1	1	0	0	1	1	1	1	1	1	1	0.83
<b>Intervention</b>													
Detailed description provided	1	0	1	1	1	1	1	1	1	1	1	1	0.92
Clinically reproducible intervention	0	0	1	1	1	1	1	1	1	0	0	0	0.58
Avoided Contamination	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Avoided cognitively stimulating co-interventions	0	0	0	1	0	0	0	0	0	0	0	0	0.08
Avoided pharmacological co-interventions	1	1	<sup>a</sup>	0	<sup>a</sup>	1	0	1	1	0	0	0	0.50
<b>Results</b>													
Appropriate analysis methods	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Statistically significant results reported	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Clinically meaningful group differences	1	1	1	1	1	1	1	1	1	1	1	1	1.00

**Table A5.** *Continued*

	Bach et al. (1995)	Breuil et al. (1994)	Chapman et al. (2004)	Koh et al. (1994)	Matsuda (2007)	Orrell et al. (2005)	Spector et al. (2001)	Spector et al. (2003)	Woods et al. (2006)	Quayhagen et al. (1995)	Quayhagen and Quayhagen (2000)	Quayhagen and Quayhagen (2001)	Average
Clinical importance reported	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Dropouts reported	0	1	1	0	1	1	1	1	1	1	0	0	0.67
Conclusions and implications													
Appropriate based on methods	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Relevant conclusion to occupational therapy	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Total score	14	17	16	14	17	20	18	21	21	18	17	16	17.50
Average score	60.87	73.91	72.73	60.87	77.27	86.96	78.26	91.30	91.30	78.26	73.91	69.57	76.09
Design (Jadad scores)	2	2	3	n/a	n/a	n/a	3	3	n/a	3	1	n/a	2.43
Level of evidence	2b	2b	2b	4	2b	2b	2b	1b	2b	2b	2b	2c	Overall grade = B

Scoring procedures: yes = +1; no or not addressed = 0.

The Jadad Quality Scale scores were based on a rating between 0 and 5; adequate score was  $\leq 3$  (Jadad et al., 1999).

\*Indicates studies examining combined effects of donepezil and cognitive stimulation therapy.

**Table A6. McMaster criteria results summary**

Study	Poor quality (<55%)	Fair quality (55 to <70%)	Good quality (70 to <85%)	High quality (85 to <100%)	Exceptional quality (100%)
Bach et al. (1995)		✓			
Breuil et al. (1994)			✓		
Chapman et al. (2004)			✓		
Koh et al. (1994)		✓			
Matsuda (2007)			✓		
Orrell et al. (2005)				✓	
Spector et al. (2001)			✓		
Spector et al. (2003)				✓	
Woods et al. (2006)				✓	
Quayhagen et al. (1995)			✓		
Quayhagen and Quayhagen (2000)			✓		
Quayhagen and Quayhagen (2001)		✓			

Quality ratings in this summary are based upon percentage of criteria reach on the quantified data obtained from the McMaster Guidelines for review of quantitative studies (Law et al., 1988).

**Table A7. Congruence of cognitive stimulation therapy with occupational therapy**

Cognitive stimulation programme	ICF domain			Prominent values important to occupational therapy <sup>a</sup>
	Body functions (improved/maintained cognitive functions)	Activities and participation in life areas	Environmental factors	
Bach et al. (1995)	<ul style="list-style-type: none"> <li>• Verbal memory</li> <li>• Latent learning</li> <li>• Attention</li> <li>• Concentration</li> <li>• Visual memory</li> <li>• Numerical memory</li> <li>• Visuomotor coordination</li> <li>• Passive acquisition and recall of information</li> </ul>	<ul style="list-style-type: none"> <li>• Greater improvements observed following longer treatment (24 weeks)</li> <li>• Improved global (cognitive, affective, social and physical function) and depressive symptoms may enhance the ability to participate in meaningful activities</li> </ul>	<ul style="list-style-type: none"> <li>• Participants were new to long-term care environment, which may have affected baseline anxiety and depressive symptoms</li> </ul>	<ul style="list-style-type: none"> <li>• Every person has the ability to participate in occupations (emphasized relationship between functional capacity, ability to plan/initiate activities and autonomy)</li> <li>• Every person can make choices about life and health, which is influenced by having choice/control in everyday occupations (programme goal to restore capacity for decision-making and control by improving mental mobility)</li> </ul>
Breuil et al. (1994)	<ul style="list-style-type: none"> <li>• Memory performance</li> <li>• Improved mental status scores (specific areas improved were not addressed)</li> </ul>	<ul style="list-style-type: none"> <li>• ADL scale used was not appropriate, and functional changes were not addressed</li> </ul>	<ul style="list-style-type: none"> <li>• Caregiver or other environmental outcomes were not addressed</li> </ul>	<ul style="list-style-type: none"> <li>• Occupation, in this case participation in cognitive stimulation activities, has therapeutic value (supported by neurobiological research)</li> </ul>
Chapman et al. (2004)	<ul style="list-style-type: none"> <li>• Programme participation decreased irritability and apathy</li> <li>• Participant's MMSE scores remained stable</li> <li>• Slower rate of decline observed in all outcome areas</li> </ul>	<ul style="list-style-type: none"> <li>• Improved global function and less decline in functional ability compared with those who are not participating in the programme (specific areas not addressed)</li> <li>• Behavioural changes may have impacted relationships with others and activity involvement</li> </ul>	<ul style="list-style-type: none"> <li>• The programme did not appear to affect caregiver QoL</li> <li>• Decreased caregiver distress was observed over time</li> <li>• Behavioural changes may have positively affected caregivers</li> </ul>	<ul style="list-style-type: none"> <li>• Every individual is unique and has intrinsic dignity/worth (programme embraced individual differences)</li> <li>• Occupation is meaningful and develops/changes over a lifetime (embraced individual life stories)</li> <li>• Occupation, in this case cognitive stimulation, may have therapeutic effectiveness (goal to enhance meaningful life involvement)</li> </ul>
Koh et al. (1994)	<ul style="list-style-type: none"> <li>• Improved scores on mental status questionnaire (primarily orientation questions)</li> </ul>	<ul style="list-style-type: none"> <li>• Participants found the programme enjoyable (not formally assessed)</li> <li>• The programme encouraged participation as it was inexpensive and did not require significant training to administer</li> </ul>	<ul style="list-style-type: none"> <li>• Caregivers or other environmental outcomes were not reported</li> </ul>	<ul style="list-style-type: none"> <li>• Every person has the capacity for self-determination (programme goal to help maintain independence in the community)</li> <li>• Every person is unique and has intrinsic dignity/worth (emphasized the importance of reinforcing individual identity)</li> <li>• Persons shape and are shaped by their environment (emphasized importance of positive context)</li> </ul>

Table A7. Continued

Cognitive stimulation programme	ICF domain		Prominent values important to occupational therapy <sup>a</sup>
	Body functions (improved/maintained cognitive functions)	Activities and participation in life areas	
Matsuda (2007)	<ul style="list-style-type: none"> <li>Programme participants did not decline in their MMSE scores, whereas a decline was observed in the control group</li> </ul>	<ul style="list-style-type: none"> <li>Emphasized importance of maintaining functional abilities and slowing the rate of decline to prolong ability to participate in meaningful activities (not formally assessed)</li> </ul>	<ul style="list-style-type: none"> <li>Persons have diverse abilities (graded programme according to differing cognitive profiles obtained from the COGNISTAT)</li> <li>Persons shape and are shaped by their environment (indicated that the programme may help reduce caregiver distress)</li> </ul>
Spector et al. (2001, 2003); Orrell et al. (2005); Woods et al. (2006)	<ul style="list-style-type: none"> <li>Increased scores on MMSE and ADAS-Cog (specific areas of improvement not identified)</li> <li>Trend towards improved communication</li> <li>Maintenance programme increased MMSE scores (specific areas not identified)</li> </ul>	<ul style="list-style-type: none"> <li>Women improved on dependency measures, which may have reduced degree of caregiver support needed (men deteriorated in this area, although less than controls)</li> <li>Improvements in general caregiver psychological distress (caregiver stress increased more the group not receiving treatment)</li> </ul>	<ul style="list-style-type: none"> <li>Congruent with principles of client-centred practice (participant input taken into account for programme development; adaptation based on individual/group needs; research focus on client-oriented outcomes)</li> <li>Participation is important to health and well-being (programme encourages inclusiveness and engagement through meaningful activity)</li> <li>Every person has intrinsic dignity/worth and capacity for self-determination (emphasis on maximizing individual potential)</li> <li>Persons are social and spiritual beings (programme is intended to be enjoyable and build/strengthen relationships)</li> <li>Every person is unique and has diverse abilities for participation (the programme was individualized based on ability level)</li> <li>Persons shape and are shaped by their environment (the aim of the programme was to maximize cognitive function while reducing caregiver burden)</li> </ul>
Quayhagen et al. (1995); Quayhagen and Quayhagen (2000, 2001)	<ul style="list-style-type: none"> <li>Improvements in overall cognitive function, word fluency and recall of non-verbal material</li> <li>Improvements in problem solving and delayed memory</li> <li>Nature of improvement appears to be associated with specific programme focus</li> </ul>	<ul style="list-style-type: none"> <li>Caregiver involvement may facilitate therapeutic outcomes</li> <li>Improved communication and interaction between dyads</li> <li>Overall impact of cognitive or behavioural changes on caregiver burden not clear</li> </ul>	<ul style="list-style-type: none"> <li>Every person is unique and has diverse abilities for participation (the programme was individualized based on ability level)</li> <li>Persons shape and are shaped by their environment (the aim of the programme was to maximize cognitive function while reducing caregiver burden)</li> </ul>

ADAS-Cog, Alzheimer's Disease Assessment Scale – Cognition; ADL, activities of daily living; COGNISTAT, Cognitive Status Examination; MMSE, Mini-Mental State Examination; QoL, qualities of life

<sup>a</sup>Programmes were compared with values central to occupational therapy as described by Townsend and Polatajko (2007). This table was intended to illustrate common themes among the programmes; it is not an exhaustive list.